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ABSTRACT

In response to the interest in environmental education programs in the schools, the state of Illinois has planned this handbook as a guide for teachers desiring to develop an environmental curriculum or to expand an existing one. The guide presents a rationale for developing such a program, including current environmental education laws and state plans. Six steps are given for organizing an environmental education program and curriculum guidelines to achieve this goal at all grade levels, K-12, are also given. In one section of the handbook, there are sample units covering topics listed in the guidelines and including all grade levels. Another section contains a listing of resources available to teachers developing environmental education programs. The handbook is designed to accommodate supplementary material when it is printed. (MA)

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ENVIRONMENTAL EDUCATION HANDBOOK FOR TEACHERS

Illinois Office of Education
Joseph M. Cronin
State Superintendent of Education

SE020 682

FOREWORD

Many Illinois educators have incorporated environmental education into existing curricula. Others have wanted to begin, but for one reason or another have been hesitant to take first steps. The Environmental Education Handbook for Teachers was developed in order to offer ideas and guidelines for implementation or expansion of environmental education programs.

It is our suggestion that such programs focus on the following definition, taken from the Environmental Education Act of 1970:

> Environmental education means the educational process dealing with man's relationship with his natural and manmade surroundings, and includes the relation of population, pollution, resource allocation and depletion, conservation, transportation, technology, and urban and rural planning to the total human environment (Public Law 91-516).

The nature of any handbook does not allow the identification of all possible useful aids for teachers and curriculum planners. For this reason, this handbook is published in such a way that further materials may be added easily. At appropriate times, the environmental education staff in my office will provide additional ideas supplementing this basic handbook.

Joseph M. Cronin

Joseph M. Cronin
State Superintendent of Education

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INTRODUCTION

The decade of the 70's began with one of the most impressive demonstrations ever witnessed in this country. The movement that was created is known by millions today as Earth Day or Environmental Teach-in. The thousands of speeches delivered on that day in 1970 constituted the alarm which sometimes must be sounded before appropriate action takes place. Initially few schools reacted; those that did, expanded their unit on nature study; others added a trip to the woods, but many lacked the experience to capitalize on the impetus and interest which Earth Day created.

Former Health, Education, and Welfare Secretary, Robert H. Finch, during the meeting of the National Association of Secondary School Principals, stated, "It is necessary to counteract the idea of environment as being something 'out there' that can be visited and then left behind at the end of the field trip. Our goal must be to see that every school has access to an environmental study area where youngsters of all ages can grow up with the concept of environment being everything that makes up their world, and with an understanding of interdependency of all its numberless elements."[1] Lee A. DuBridge, former science advisor to President Nixon, in an address to the American Association of School Administrators said, "The very act of living in an industrialized society -- contributes to the using up of resources and the creation of waste.... The question is how to get the pollution down to a reasonably harmless and unobjectionable level."[2] The thrust of DuBridge's remarks was one of inculcating environmental issues and concerns into all discipline areas and spanning all grade levels. In a late 1970 report from the National Education Association (NEA), it was found that only 781 of the nation's 7143 school districts with enrollment of 1000 or more (11 percent) have environmental education programs large enough to engage a half-time staff person.[3] The NEA report found most programs focusing on science rather than being integrated into all subjects of the curriculum. Although the NEA report did not find more than 25% of the programs operating on a year-round basis, authorities agree that environmental education should operate throughout the entire school year and if possible, allow for a summer residence program. The problems and process of environmental education should be considered year round.

Environmental Education Defined

Environmental education is a multi-disciplinary approach to the study of man's relationship to his natural and man-made surroundings including the relation to the conservation of natural resources, pollution, population growth and distribution, food production, energy demands, transportation, recycling, and solid waste disposal, noise pollution, preservation of wilderness areas, technology, and rural and urban development.

Through the use of local examples, environmental education attempts to create a citizenry that understands ecological principles and environmental problems taught through discovery and issue-oriented methods. It fosters understanding not only of the external, but also of the inner environment of the person. The formation of an attitude of responsibility for the environment, an "environmental ethic," is mandatory.

Environmental education is not limited to the formal education years, but continues through life as it maintains the public philosophy necessary to foster a futuristic attitude -- one which exhibits man as a participant in and not a master of the natural world.

Historical Development

It was during President Theodore Roosevelt's administration that national concern for natural resources was initiated. The conservation movement which occurred during the first decade of the twentieth century has often been described as one which will never again be witnessed. During that era, Gifford Pinchot, who many consider the father of conservation, established three basic principles which later became the foundation for the conservation movement. They were stated as follows:

1. Develop and use the natural resources now existing on this continent for the benefit of the people who live here now.

2. Conservation stands for the prevention of waste. The first duty of the human race is to control the earth on which it lives.

3. The natural resources must be developed and preserved for the benefit of the many and not merely the profit of the few.[4]

These principles were later enlarged upon as evidenced by the nature of the topics discussed at the Conservation Congresses. The conservation of child life and manhood, the public control of railroads, the regulation of speculation and gambling in foodstuffs, agricultural extension services and the treatment of river drainage were only a few of the topics discussed in 1911 and 1912.

In 1909, the National Conservation Association was founded. During that year, conservationists announced that the conservation of natural resources could only be accomplished with a "wide campaign of education which must begin in the universities in national and state organizations and must extend from them through the secondary and primary schools to the whole people."[6]

During the next forty years, conservation education efforts experienced compartmentalization, i.e., forestry conservation, wildlife conservation, etc., which resulted in part from the establishment of a governmental bureau for each of the natural resources. This was followed by similar departmentalization of studies in the universities.

The study of the environment also has roots in other educational program areas, i.e., natural history, the study of nature which sought to increase our appreciation of the wilderness; outdoor education, created from the need to develop theories and methodology for outdoor recreation as it relates to the total curriculum; and citizenship education, concerned with cultural and aesthetic appreciation which fostered social action.

State Developments

Illinois educators, concerned with the lack of attention given to conservation education, generated a response from the Office of Superintendent of Public Instruction as early as 1943. At that time, a committee of professional educators and laymen was established to begin the implementation of conservation education in the schools. A massive teacher in-service program was planned, and approximately 5,000 teachers participated during the next three years. Later, a full-time position in conservation education was created within the Office of the Superintendent of Public Instruction.

In 1957, the General Assembly created a Division of Conservation Education in the Office of the Superintendent of Public Instruction and established an Advisory Board. This Board, composed of the Superintendent of Public Instruction, the Director of the Department of Conservation, the Director of the Department of Agriculture, a representative of the Illinois Association of Soil and Water Conservation Districts, and a representative of the universities, was authorized to make recommendations concerning the conservation education program. This legislation prompted many schools to include the study of natural resources in their curriculum.

Not until 1967, however, did the teaching of conservation education in all public schools become law (refer to Section I). This legislation mandated that in every public school there shall be instruction, study, and discussion of current problems and needs in the conservation of natural resources, including but not limited to, air pollution, water pollution, the affects of excessive use of pesticides, preservation of wilderness areas, forest management, protection of wildlife and humane care of domestic animals. Legislation enacted in 1968 strongly suggested the inclusion of outdoor education experiences in the school program.

In January, 1971, a number of educators concerned with environmental problems gathered at Loredo Taft Field Campus in Oregon, Illinois to discuss a mutual interest -- the need for an environmentally aware citizenry. They realized that in order to accomplish their goal it was necessary to implement a strong, effective educational program. With this in mind, a concerted effort resulted in the development of a formal proposal which was subsequently submitted to Governor Richard Ogilvie. In January of 1972, the Office of the Superintendent of Public Instruction was made aware of the lack of attention to this proposal; and, therefore, agreed to accept responsibility for its completion and implementation. Four regional hearings were conducted to offer citizens the opportunity to become involved in planning for an environmental education program. Subsequent to these hearings, the Superintendent of Public Instruction authorized an operating budget for the development of a Master Plan for Environmental Education and appointed a Task Force charged with this responsibility.

Throughout the summer and into December, 1972, several meetings were held to produce a refined working document. The members of the Task Force for Environmental Education identified six critical needs in environmental education: the formation of an organizational and communications network to facilitate program implementation; curriculum development; teacher preparation; development of the school site into a learning laboratory; establishment of an effective adult education program; and evaluation of the program's progress (refer to Section II).

FOOTNOTES

1. Robert H. Finch, Speech delivered to the National Association of Secondary School Principals Conference, February, 1970; cited in Environment and the Schools, Education U. S. A.: A Special Report, p. 4.

2. Lee A. DuBridge, Speech delivered to the American Association of School Administrators, 1970; cited in Environment and the Schools, Education U. S. A.: A Special Report, p. 5.

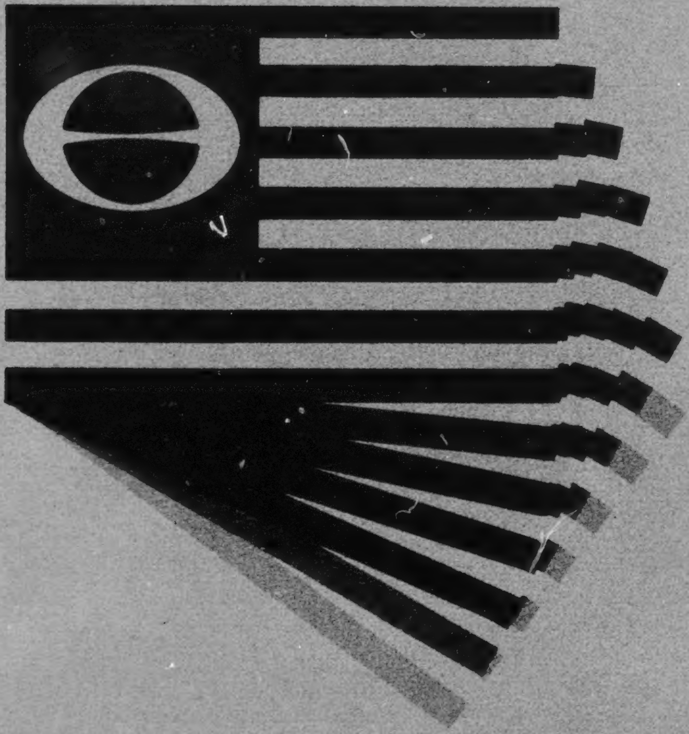
3. Environmental Education in the Public Schools: A Pilot Study: Washington, D. C.: National Education Association, 1970, p. 5.

4. Gifford Pinchot, The Fight for Conservation. New York: Doubleday, Page and Company, 1910, pp. 43-46.

5. See Proceedings, Third National Conservation Congress (Kansas City, Missouri, 1912), pp. xxii ff.; Proceedings, Fourth National Conservation Congress (Indianapolis, 1912), pp. 18-23.

6. Charles R. Van Hise, The Conservation of Natural Resources in the United States, New York: The Macmillan Company, 1910, pp 2-14.

THE LAW



The following paragraphs summarize portions of The School Code of Illinois relevant to environmental education. No attempt is made to summarize other State or National environmental laws.

CONSERVATION EDUCATION

An Act in relation to the promotion of conservation education and establishment of a division of conservation education in the Office of Superintendent of Public Instruction. (Approved June 29, 1957.)

Definitions. 1. As used in this Act: (a) "State agency" means the Board of Trustees of the University of Illinois, the Board of Trustees of Southern Illinois University, the Board of Governors of State Colleges and Universities, boards of education and boards of directors of public schools, elected State officers and departments, boards and commissions and other agencies of State government.

(b) "School" means any school or class established by this Act. (Amended by Act approved May 5, 1967.)

Establishment of Division of Conservation Education. 2. There is hereby established a Division of Conservation Education in the Office of the Superintendent of Public Instruction.

Advisory Board. 3. An Advisory Board is hereby established consisting of the Director of Agriculture, the Director of Conservation, the Superintendent of Public Instruction and two members to be appointed by the Governor. One member shall be a representative of the colleges and universities of the State of Illinois and one member shall be a member of a soil conservation district within the State of Illinois. All appointive members shall be appointed for terms of three years except when an appointment is made to fill a vacancy, in which case the appointment shall be made by the Governor for the unexpired term of the position vacant. The Advisory Board from time to time shall make recommendations concerning the conservation education program within the State of Illinois. In selecting the appointive members of the Advisory Board, the Governor shall give due consideration to the recommendations of such professional organizations as are concerned with the conservation education program. Members of the Advisory Board shall serve without compensation but shall be reimbursed for actual and necessary expenses incurred in the administration of the Act.

The Advisory Board shall select its own Chairman, establish rules and procedures not inconsistent with this Act and shall keep a record of matters transpiring at all meetings. The Board shall hold regular meetings at least four times each year and special meetings shall be held at the call of the Chairman or any three members of the Board. All matters coming before the Board shall be decided by a majority vote of those present at any meeting.

Powers and duties of Division. 4. The Division shall have the power and it shall be its duty:

A. To cooperate with the Federal government and the State agencies engaged in a program of adult education to the extent and in the manner necessary to carry out the provisions of this Act.

B. To promote and aid in the establishment of schools and classes within the State, for the purpose of teaching the methods of conservation of wildlife, forests, timber lands, minerals and scenic and recreational areas, soil and water concerning which the Departments of Agriculture and Conservation of the State of Illinois have an interest. The Division may establish and operate branches of such schools at any location in this State determined by the Division to be suitable therefor and as the public convenience may require.

C. To cooperate with other State or Federal agencies in the operation of schools and branches thereof in developing and teaching a conservation education program and, with the approval of any State agency effected, may use the facilities under the control or custody of any other State agency. All State agencies are granted authority to permit the use of their facilities for such purpose and to cooperate with the Division in the development and teaching of conservation education programs.

D. To establish courses to be taught in the conservation education program, with the advice of the Advisory Board. (Amended by Act approved June 13, 1963.)

Persons eligible to enroll--Charges. 5. The conservation education program shall be open to any persons interested in the courses offered in any school or branch thereof.

The Division shall encourage the establishment of classes, and sponsors of classes established may make reasonable charges to persons enrolled in such schools for the cost of any board, lodging, textbooks, and other text materials, field trip transportation and student activity costs furnished in connection with such schools but such charges shall not exceed the actual per capita expense of furnishing the same. (Amended by Act approved June 13, 1963.)

Charges. 6. (Repealed.)

Rules and Regulations. 7. With the approval of the Advisory Board the Division shall promulgate, and from time to time may change, reasonable rules and regulations not inconsistent with the provisions of this Act, for the proper administration of the Act. Such rules and regulations and changes therein shall be filed and shall become effective as provided by "An Act concerning administrative rules," approved June 14, 1951.

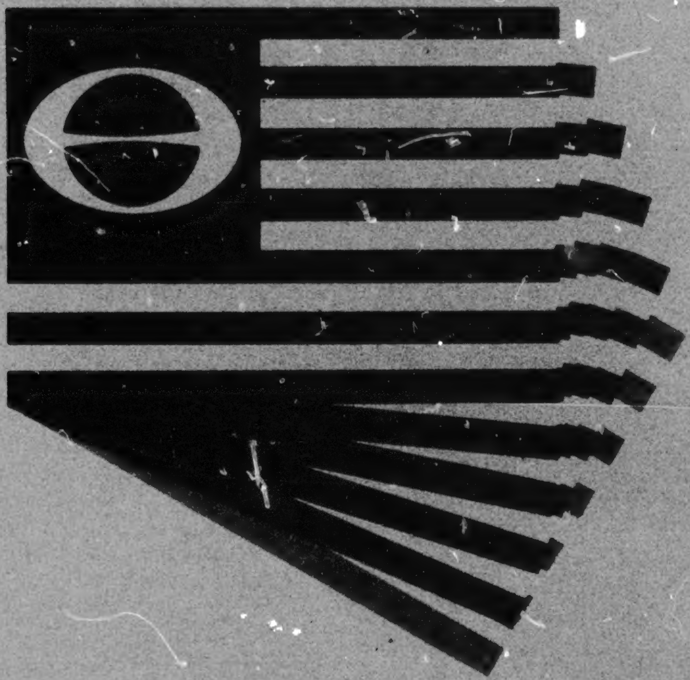
(8. Appropriation.)

(Note: Chapter 122, Sections 698.1 to 698.7, inclusive, Illinois Revised Statutes, 1969.)

Sec. 10-22.29. Outdoor education. To offer, if deemed appropriate, outdoor education, and to use school funds for the expenses of the outdoor education program, within the State of Illinois, or adjacent States, whether within the school district or not, including the purchase or renting of facilities either individually or jointly with any other school district or districts. (Amended by L. 1968, H.B. 2526, approved September 6, 1968.)

Sec. 27-13.1. Conservation of natural resources. In every public school there shall be instruction, study and discussion of current problems and needs in the conservation of natural resources, including but not limited to air pollution, water pollution, the effects of excessive use of pesticides, preservation of wilderness areas, forest management, protection of wildlife and humane care of domestic animals. (Added by Act approved August 7, 1967.)

STATE PLAN FOR ENVIRONMENTAL EDUCATION



STATE PLAN SUMMARY

I. Organizational Structure

The Plan proposes a communications network to implement an environmental education program of the size and scope necessary for Illinois. It is recommended that the Advisory Board and the Environmental Education Program be expanded to better meet contemporary needs. It is also recommended that regional consultants responsible for Environmental Education begin providing leadership in each Illinois Office of Education Region and that each local district designate an environmental education coordinator.

II. Curriculum Development

The Plan provides broad curricular guidelines for implementation of environmental education programs on a K-12 basis. The guidelines are both sequential and multi-disciplinary. Five themes are identified--Interdependence, Impact, Maintenance, Quality of Life, and Improvement.

III. Preparation of Teachers

Well-prepared teachers, administrators and support personnel are necessary if efforts in environmental education are to be successful. Furthermore, individuals working with children and adults outside the classroom must possess the understanding, experience and skills needed for effective implementation of environmental action. Therefore, the Plan proposes a body of knowledge, skills and experiences to be inculcated in pre-service and in-service training of administrators, teachers, and leaders of youth and adults.

IV. Facilities and Equipment

Facilities for environmental education must include various kinds of locations and equipment. These facilities should be used at the appropriate time in the formal and non-formal educational process of all citizens. The Plan sets forth guidelines for the design and use of environmental education facilities placing emphasis on managing the school in an ecologically-sound manner and in using the entire school site and community to the best advantage.

V. Continuing Education

Adults are being asked to make important decisions and to take action on environmental issues with insufficient information and without verified knowledge. The Plan recommends programs of continuing education to develop the attitudes, knowledge, values, and skills that are required if adults are to contribute to decisions on issues both within the immediate and total environment.

VI. Evaluation

The Plan calls for continuous evaluation of its own effectiveness. It provides for analysis and evaluation of environmental awareness, attitudes, materials, facilities, and legislation.

STATE PLAN

for

ENVIRONMENTAL EDUCATION

FOREWORD

A concern for the use of Illinois' natural resources was shown as early as 1943 by the Superintendent of Public Instruction. At that time, a committee was established to begin the implementation of conservation education in the schools.

In 1957, the General Assembly created a Division of Conservation Education in the Office of the Superintendent of Public Instruction and established an Advisory Board to make recommendations concerning the conservation education program. This legislation prompted many schools to include the study of natural resources in their curriculum. Not until 1967, however, did the teaching of conservation education in all public schools become law.

In response to a refocusing of public attention upon the fate of our natural systems, statewide hearings were conducted in 1971 to allow the citizens of Illinois to voice their concerns relative to environmental education. Those who responded to this offer gave testimony concerning various environmental ills: air pollution, water pollution, excessive use of pesticides, energy demand, solid waste, rapid urbanization, and others. They repeatedly stressed the need for inclusion of these topics in school curricula. It was thought that knowledge of the interdependence of natural and cultural systems would provide a sound basis for developing value systems conducive to environmental improvement.

Subsequent to these hearings, a Task Force for Environmental Education was established which was composed of citizens representing a wide diversity of interests. This committee was to develop a means of incorporating environmental education into the school system. A plan, based on the report of the Task Force, was designed to speak to the future needs of society.

The development of an environmentally-literate citizenry is not solely the responsibility of the Illinois Office of Education. The Illinois Board of Higher Education is developing a master plan for environmental education applicable to the colleges and universities. Other state agencies are also actively involved in improving environmental education.

This document presents to the citizens of Illinois a plan by which awareness of, and responsibility for, environmental problems may be gained. The elements contained herein offer a basic outline for the improvement of environmental education in the State of Illinois.

ORGANIZATIONAL STRUCTURE

In Illinois, every person has a right to a healthful environment.[1] Furthermore, Illinois citizens have mandated "the educational development of all persons to the limits of their capacities."[2] These interwoven rights constitute the basis for environmental education in Illinois.

Although the Illinois Office of Education has borne much of the responsibility for conservation education in the past, this office alone cannot fully meet the needs as outlined herein for a comprehensive environmental education program. Assistance must come from a great variety of agencies, institutions, organizations, community groups and individuals in the form of guidance, cooperation and resources. With the adoption of this Plan, the Office of Education places environmental education on a priority level. In cooperation with the Illinois Institute for Environmental Quality, which has the charge of evaluating curricula at all levels of education and providing assistance to instructors, this Office will serve as the initiating, coordinating, and evaluating agency.

DISCUSSION

I. The Advisory Board for Conservation Education

The Division of Conservation Education and its Advisory Board were established by an act of the Illinois legislature in 1957. Because of a new and enlarged perspective which recognizes the relationships between society and the environment, it is necessary to amend the existing conservation education legislation as follows:

a. The name of the Division and the Advisory Board should be changed to reflect the new emphasis on the total environment, by using the descriptor Environmental Education.

b. The membership of the Advisory Board should be enlarged to more accurately represent the various interest groups.

The Advisory Board is now composed of the Director of the Department of Agriculture, the Director of the Department of Conservation, the State Superintendent of Education, a representative of the Illinois soil conservation districts and a representative of the colleges and universities.

This Board should be expanded to include the Director of the Institute for Environmental Quality, the Director of the Department of Public Health, the

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[1] Article XI, Section 1. Constitution of the State of Illinois, 1970.

[2] Article X, Section 1. Constitution of the State of Illinois, 1970.

Executive Director of the Board of Higher Education and annually, the recipients of the Environmental Teacher of the Year Awards. Further, the State Superintendent of Education should appoint one member from among the following groups: school administrators, environmental organizations, and lay citizens.

The primary environmental education goal of the Illinois Office of Education shall be to implement a statewide program which will help citizens to understand and minimize their impact on the natural surroundings. If this goal is to be accomplished, the Illinois Office of Education must provide the stimulation and leadership for implementing the State Plan.

II. Educational Consultants for Environmental Education in the Illinois Office of Education

The duty of the consultant is to infuse into all levels of the educational system a concern for environmental awareness and understanding. The consultant shall be at the level of authority with those responsible for the various subject areas and shall work closely with them. Major responsibilities shall include:

1. Working closely with the various subject matter departments to provide leadership in the development of appropriate curricular materials and guidelines for use by school personnel.

2. Working closely with teachers, administrators, school board members and community groups to stimulate and improve programs for environmental education.

3. Serving as liaison between the Illinois Office of Education, the institutions of higher education and other Illinois state and private agencies.

4. Stimulating research relative to the knowledge, attitudes and behavior of children and teachers concerning the environment and for continual evaluation of programs.

5. Working closely with the Regional Consultants.

III. Regional Consultants

There should be an Educational Consultant responsible for environmental education in each of the five statewide regions of the Illinois Office of Education to offer technical assistance to local districts. These people should work in concert with the Springfield-based Educational Consultant responsible for Environmental Education to provide liaison and services to the Educational Service Regions (ESR's). These technical assistance consultants shall serve as catalyst and resource persons for:

1. School Approval Services in environmental education in the region.

2. Inservice training of teachers.

3. Assisting schools with curriculum planning.

4. Coordinating the resources, both materials and human, within the region.

5. Enhancing communication among local school coordinators, local college personnel, media people and others involved in environmental education.

6. Assisting in the establishment of Environmental Education committees and councils, and their coordination.

The base of operation for the consultants should be one of the regional technical assistance team offices. The facilities, at a minimum, should consist of an office, storage space, a meeting room, and a demonstration area for educational materials. Internship arrangements with colleges and universities would be most appropriate.

IV. District Environmental Education Coordinators

The most critical factors in the integration of environmental education into schools are those of local initiative and leadership. Hence, there should be an Environmental Education Coordinator in each school district.

The District Coordinator's role should include, but not be limited to:

1. Providing the leadership, inspiration and direction necessary for effective implementation of environmental education plans.

2. Developing a district environmental education curriculum that fully meets the spirit of the legislation and the needs of the locality.

3. Assisting in teacher preparation -- including inservice activities, workshops and institute programs; also promotion and coordination of appropriate courses by colleges, universities and private agencies.

4. Identifying useful resources including printed and non-printed media, natural and man-made study sites and local human resources. The coordinator should also assist teachers in the utilization of these resources.

5. Serving as a consultant to personnel within the local district; arranging for consultants to be brought in to assist with instruction, and maintaining and using a list of local citizen consultants.

6. Establishing an Environmental Education Committee composed of faculty representatives from each building, administrators, students, support personnel and key citizens. This committee should assist the District Coordinator in meeting his or her responsibilities.

V. District Environmental Education Committees and Councils

The District Environmental Education Committee should consist of the Environmental Education Coordinator from the school district, teachers, administrators interested persons from local organizations and other concerned citizens. The primary function of the District Environmental Education Committee is to serve as an advisory board for the Environmental Education Coordinator.

Educators and other interested citizens in the Educational Service Regions are encouraged to establish Educational Service Region Environmental Education Councils.

The ESR Environmental Education Council should consist of the Regional Technical Assistance Team Consultant, the Environmental Education Coordinator from each school district, teachers, administrators, interested persons from local organizations and other concerned citizens. The activities and responsibilities of the ESR Council may range from the operation and governance of an Enivronmental Education Center to the sponsorship of teacher education programs.

VI. Role of State and Private Agencies

It is fully recognized that a vast array of agencies, organizations, and associations in Illinois have legislative and historical responsibilities and interests in environmental education.

Agencies such as the Illinois Institute for Environmental Quality, Department of Conservation, and Soil and Water Conservation Districts, are particularly involved in environmental education. The Environmental Protection Act creating the Institute for Environmental Quality specifically mandates that agency a major role in funding, curricular development, and teacher preparation for environmental education. The Illinois Department of Conservation has resources and personnel that have long been available to schools for conservation and environmental programs. Also, the Soil and Water Conservation Districts have long been interested in environmental education. The input of their local councils is deemed particularly important.

In addition, the private sector has important roles and responsibilities in environmental education and in implementing this plan. The continuing assistance and cooperation of organizations and foundations such as Illinois Wildlife Federation, Izaac Walton League, Open Lands Project, Women's Clubs, and others are needed.

They are encouraged to join with the Illinois Office of Education in implementing this plan.

OBJECTIVES

In order to implement an environmental education program of the size and scope necessary in Illinois, the following objectives pertaining to the organizational structure have been established:

1. By September, 1975, a legislative proposal will have been introduced which will effect the aforementioned changes in the name of the unit and the name and structure of the Advisory Board.
2. By June, 1976, the State Superintendent of Education will have encouraged local education agencies to designate District Environmental Education Coordinators.
3. By July, 1976, the State Superintendent of Education will have established the position of Education Consultant responsible for environmental education on each of the five regional Technical Assistance Teams.
4. By October, 1976, the Educational Consultant responsible for environmental education will have encouraged local education agencies and District Environmental Education Coordinators to establish District Environmental Education Committees.

CURRICULUM DEVELOPMENT

Today, people have the scientific and technological "know-how" to solve many environmental problems. But decisions regarding man's use of his environment are seldom based on purely scientific knowledge. Virtually all human decisions are based on custom, oversight, economic feasibility, political expediency, social desirability or religious belief. It is impossible to make wise decisions about the environment without an understanding of economics, history, political science, sociology, psychology and the humanities, as well as the natural sciences. This calls for a new educational approach termed "environmental education."

DISCUSSION

Prior to discussion of curricular development in any given area, the area must first be defined. The Environmental Education Act of 1970, landmark legislation which reflects a national commitment to the search for enlightened life styles, has provided a definition of environmental education. The language of the Senate report explaining the Act follows:

> Environmental education is an integrated process which deals with man's interrelationship with his natural and man-made surroundings, including the relation of population growth, pollution, resource allocation and depletion, conservation, technology and urban and rural planning to the total human environment. Environmental education is a study of the factors influencing ecosystems, mental and physical growth, living and working conditions, decaying cities and population pressures. Environmental education is intended to promote among citizens the awareness and understanding of the environment, our relationship to it and the concern and responsible action necessary to assure our survival and to improve the quality of life.

Curriculum planning is a complex process which involves deciding what is to be taught and how it can be taught most effectively. The task of curriculum planning for environmental education is, in many ways, more difficult than the task of planning a curriculum for one of the standard school subjects. Mathematics, science or social studies each has a disciplinary basis which can serve as a guide in deciding what it draws from many disciplines. Environmental education is concerned with broad problems rather than with disciplines. The subject matter of environmental education includes those activities of people which have significant environmental impact. Examples of these are: air pollution, heavy metals, energy supply and demand, transportation, recycling and solid waste disposal, noise pollution, the effects of excessive use of pesticides, preservation of wilderness areas, forest management, protection of wildlife, and human settlements, values, and behavior.

The content areas may be treated with varying degrees of sophistication, depending on grade level. The following guidelines should be employed in developing and implementing a curriculum in environmental education:

a. Since environmental education is multidisciplinary, it should be integrated into all regular school subjects. A means of integrating environmental education into all school subjects is through the use of conceptual themes which pervade the entire curriculum. The following broad themes have been identified as an aid to curriculum planning:*

Theme 1. INTERDEPENDENCE

Understanding the interdependence of living and non-living things is fundamental to understanding and appreciating ideas related to other

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(*It should be noted that at the secondary level, courses specializing in environmental studies may be appropriate. The presence of one, or a series of environmental courses, cannot, however, substitute for the environmental orientation that should be given to all teaching. Furthermore, curriculum planners and career personnel should give full consideration to manpower needs and to preparing students for environmental careers.)

themes. One cannot appreciate the significance of human impact on the environment, the need for maintenance of our world, ideas related to the quality of life or issues related to its improvement without first comprehending the interconnectedness of our world.

Theme 2. IMPACT

Because of our numbers and our technology, people have become capable of modifying the environment, not only to the extent of changing the character of the landscape, but by altering some of the natural cycles which are essential to continuation and renewal of life. Growing from the concept of interdependence, an understanding of the significance of possible dangers of human impact on natural cycles constitutes a second broad area necessary in the development of environmentally-literate citizens.

Theme 3, MAINTENANCE

Natural environments tend to be self-renewing because of the continued input of solar energy and other natural cycles. Things that are built by people, on the other hand, tend to degrade with the passage of time unless energy is expended to maintain them. Our houses, cars, clothing, and other possessions need to be repaired, cleaned, and maintained or else they rapidly deteriorate and become unusable. Our cities, villages, and other constructed environments need continual care.

Theme 4. QUALITY OF LIFE

The quality of life of all living things is dependent on the quality of the environment. How we appraise the quality of life depends on our values, but most people will agree that the environment in which we live affects how we feel and act toward ourselves and others.

Theme 5. IMPROVEMENT

Improving the quality of life should be a central goal of our times. To achieve this goal, we must know what it means, value it and then organize our knowledge and resources to bring about inmprovement. To make our lives better will not be easy. Because of environmental decay, rapid growth and social ills, such as crime and violence, we must expend massive amounts of effort, brainpower and money just to stabilize society. To improve the quality of our lives, and not let it decline, remains one of the greatest challenges of our society. How successful we are depends on our knowledge, value, and ability to organize resources.

b. In addition to the curricular themes, the following aspects of a quality environmental education program should be considered:

1. Environmental education involves knowledge, attitudes, and skills which learners should experience directly. Both indoor and outdoor activities should be provided and should deal with issues and problems

in, around, and beyond the local school and community.

2. Since environmental education is concerned with the development of attitudes and consequent changes in behavior, a wide range of instructional techniques should be used including role-playing, debates and simulation games.

3. Since environmental education is designed to cause people to examine their values in relation to environmental concerns, such as quality of life and human relation to other species, instruction should involve open discussion of personal and cultural values, how these values have originated and how the values affect behavior.

4. Since environmental education cannot avoid the controversy which is inherent in environmental issues, instruction should capitalize on controversy by: identifying the opposing positions and vested interests and examining the information which is the basis of the controversy; specifying the values and motives of each interest group which result in their respective position; evaluating alternative courses of action with respect to both immediate and long-range consequences for each of the interests; and encouraging students to specify their own values or motives, take a position which is consistent with these and defend their position from an environmental point of view.

5. Since environmental education is concerned with many problems and issues in, around and beyond the school, there should be opportunities for parents and other community residents to participate in the many phases of planning, development, and implementation of the local program.

OBJECTIVES

1. By June 1976, the Illinois Office of Education will have urged each school district to begin the design of an environmental education curriculum.

2. By September, 1976, the Illinois Office of Education will have produced and made available to teachers a Handbook of Environmental Education. The handbook will include, but be limited to, an elaboration of instructional themes and sample objectives for environmental education.

3. By September, 1976, the Illinois Office of Education, in concert with other agencies, will have supported the development and distribution of a Guide to Instructional Materials.

4. By September, 1977, the Illinois Office of Education, in concert with other agencies, will have compiled and disseminated directories of the following:

   a. Environmental organizations.

   b. District Environmental Education Coordinators.

c. Environmental education facilities (outdoor education centers, etc.).

d. Non-school environmental education programs (governmental agencies, private organizations, industry, etc.).

e. Periodicals and Newsletters.

5. The Illinois Office of Education will provide continuous assistance to local school districts in developing environmental education programs at the request of the district.

PREPARATION OF TEACHERS

Well-prepared teachers, administrators and support personnel are necessary if efforts in environmental education are to be successful. Individuals working with children and adults, in and out of the classroom, must possess the understanding, experience and skills needed for effective implementation of environmental action. Furthermore, they must perceive environmental education to be of critical importance, approach it with the sense of urgency it deserves, and be ready to apply the effort that may be required.

DISCUSSION

All teachers should teach environmentally in all disciplines through a process which emphasizes the use of direct experiences both in and out of the classroom and calls upon the support of all community resources. Environmental education must demonstrate the very intimate interaction between the cultural and natural systems.

ELEMENTARY LEVEL

I. Teacher preparation programs should assure the knowledge of:

a. Environmental education as a process of education as well as a product, a part of science, social studies and all other disciplines (assuming problem and experience orientation).

b. A foundation of information upon which to base an understanding of the natural and cultural environmental systems including natural and ecological laws.

c. Various specific environmental situations in the immediate area.

d. Political, economic and industrial systems and their relationship with the environment.

e. Materials which teachers and their students utilize daily and the source and ultimate disposal of such materials. Teachers should understand the environmental impact resulting from production of such material.

f. The impact of human population growth and distribution and the ecological relationship of man with other living things.

g. The importance of technology assessment, the need for short- and long-term planning, and the relationship of these to environmental management.

II. Teacher preparation should provide an experiential background which will assure that teachers acquire appropriate skills and abilities through:

a. Exposure to a wide variety of cultural (social, economic, religious, historic, governmental, etc.) agents and processes.

b. Activities with and in a variety of environments ranging from the pristine to the highly managed, the rural to urban, and the unspoiled to the abused.

c. An in-depth study of a problem-solving nature under the direction of a qualified individual concerning an environmental situation.

d. Working with children and adults in a variety of environments inside and outside the school building and utilizing a variety of resources, sites, situations, and people.

e. Exposure to the practical, daily aspects of pollution control and abatement.

f. Interpreting a variety of curricular materials and experiences to students in such a way as to be meaningful to the students' own lives, situations, 'and communities.

g. Assisting learners in discovery of various environments and their associated issues.

h. Developing rapport with community leaders and effectively influencing decision makers.

i. Assisting learners to develop positive self-concepts and to make decisions regarding their lives that are ecologically sound.

j. Objective discussion of controversial issues.

III. The program shall allow for the development of a behavior which:

a. Indicates possession of an environmental ethic typified by an ecologically sound life style -- one to be emulated by others.

b. Indicates interest and concern for local and community affairs.

c. Reflects flexibility and innovation in their teaching.

d. Stimulates youth involvement in community issues as well as those of state and national scope.

SECONDARY LEVEL

I. Secondary teachers should possess the knowledge, skills, and abilities as outlined for elementary teachers and have had opportunities for exposure to similar experiences. Since secondary students have more of an opportunity to contribute to the solution of problems, teachers should also have the competencies necessary for:

a. Working with students in problem-solving experiences in many situations and environments.

b. Assisting students in identifying resources and analyzing environmental problems and issues.

Some teachers will be called upon to teach courses focusing on environmental issues. Teachers of such courses should have an in depth knowledge of:

a. Natural and ecological laws.

b. Political, economic and industrial systems and their relationship to the welfare of society and the environment.

c. The impact and implication of human population growth and distribution for man, the ecosystem and all life.

Many Illinois Teachers lack sufficient preparation in environmental education. The lack of adequate training and knowledge is the result of: lack of concern, absence of formal environmental education training, insufficient attention to programmatic concerns by professional educators, and lack of good environmental courses.
In order to alleviate the foregoing problems, it is necessary to establish a training program for teachers and administrators presently working in the schools. It is essential to involve various experts, peer to professional, scientific and educational communities and interested citizens. On-site experiences dealing with specific problems, environments, and situations should be included.
During the 1975-1976 school year, every school district administrator should be informed about the State Plan, their role in the implementation of the recommendations and ways in which they should assist their staff and community leaders.

All teachers should be informed of the ramifications of the Illinois environmental education program, realize its importance and understand their role and responsibility in its implementation.

"In depth training" should be provided for at least 5% of the teachers in Illinois each year. Emphasis should be placed on local on-site experiences and on cooperation among schools, Illinois Office of Education, colleges and universities, and the various agencies involved in working for a quality environment.

OBJECTIVES

1. By September, 1976, the Illinois Office of Education will have encouraged every school district to devote at least one inservice day a year to environmental education.

2. By September, 1976, a series of inservice training programs for teachers will be developed on the: themes of environmental education in Illinois; objectives of environmental education; multi-disciplinary nature of environmental education; the State Plan for Environmental Education; and teaching methods and techniques for meeting the objectives of environmental education in the State Plan.

3. By September, 1976, the Illinois Office of Education will have met with the Illinois Board of Higher Education and the appropriate staff of the higher education institutions which offer graduate level courses in areas of Outdoor and Conservation Education to urge an emphasis on environmental education in those courses.

4. By December, 1976, the Illinois Office of Education will have organized a committee to form an "Environmental Education Resource Center" with the following possible components: films, filmstrips, tapes, printed materials comprehensive materials, and individualization models.

5. By July, 1977, the Illinois Office of Education will have developed plans to sponsor workshops for one or more pilot school districts for a one-week period in order to prepare these districts to develop a total environmental education concept.

6. The Illinois Office of Education will continue to cooperate with various interested institutions in developing proposals for submission to the National Science Foundation, the U.S. Office of Education, and similar agencies to request funds to support practitioner workshops.

FACILITIES AND EQUIPMENT

Facilities for environmental education must include various kinds of locations and equipment. The facilities should be used at the appropriate time in the formal and non-formal educational process of all citizens. Furthermore, these facilities should be designed, planned, and utilized in an ecologically sound manner.

DISCUSSION

Types of Facilities and Equipment

The locations and facilities at which environmental education should take place will vary from area to area. One must look carefully at the community when identifying and listing them. Generally they include public and private facilities and sites such as: open spaces, parks, roof tops, retail shops, industries, ghettos, and luxury homes.

The items of equipment to be provided should be of the simplest type obtainable to accomplish the educational purposes. Much of the equipment used in environmental education can be constructed and prepared by the students themselves.

Why Utilize Community Facilities

The fact that community facilities are readily available to provide firsthand experiences and that these facilities are already a part of the student's environment justifies utilizing such facilities.

Until recently, most planners working for various public and private agencies have not worked in concert to meet the needs of the citizenry. Before additional funds are spent on programs and facilities, more inter- and intra-agency cooperation must take place in planning to more effectively meet the needs of the community. An example is the limited cooperation among many school and park districts in providing a total service to the public. With the increase in amount of leisure time and the concern about the deterioration of the environment, the resources of schools, parks, museums, and other agencies must be combined into coordinated programs.

Where to Start in Utilizing the Existing Facilities

The classroom is the beginning point in environmental education for students and their teachers. Much of the substance of environmental education may be taught indoors. The school site (the grounds, the building and all it contains in the way of materials and people) is the next most readily available location and source of resources which should be utilized to the maximum extent possible to expand and upgrade the quality of the educational program.

Once the teacher is more secure and knowledgeable about the community, the people, the institutions, the natural and political history of the area, and environmental conditions and alterations, a greater variety of lessons may be planned. To utilize these resources to the fullest, the students will necessarily move away from the school site and into the community. These experiences may be as brief as a few minutes, a class period, or they may extend through several days of resident experience.

Considerations in Planning Future Facilities

Facilities should be planned to increase the diversity of the types of educational experiences that can take place at the facility. The architect should follow basic ecological principles in designing the heating, lighting, cooling, waste disposal, insulation, and acoustical systems. Several state and federal agencies have the mandates and expertise needed to assist in planning and developing facilities. Full use should be made of their services by those responsible for facilities.

The materials used in construction should be of types that consume as few non-renewable resources as possible and are obtained at the smallest possible environmental cost.

Locations for conversation, thought and reflection should be provided in the building and elsewhere to provide for interaction of people and the environment in large groups or for isolated study.

Developing Plans for Using the Facility

These may serve as guides in developing plans to use facilities for environmental education:

1. Use teams consisting of members from all parts of the community including administrators, teachers, parents, students, and interested citizens.

2. Identify the educational resources at the facility from the viewpoint of possible multi-disciplinary use.

3. Examine the facility and develop plans and approaches for increasing the diversity at the site. Learners should be provided the opportunity to participate in the planning stages through the implementation of ecologically and educationally sound programs.

State Environmental Education Demonstration Centers

One or more Environmental Education Demonstration Centers should be designated for the State of Illinois. The purpose of the Centers should be to actively conduct research, and develop and disseminate environmental education activities.

These centers may operate in a manner similar to the Agriculture Experiment Stations. The Regional Technical Assistance Consultant and District Environmental Education Coordinators would have direct working relationships with the Demonstration Centers. A center might be entirely independent of any school or college; or it might be a part of a school district, Educational Service Region, college or university, or whatever.

The Center staff may or may not be a part of the Illinois Office of Education and be paid by the state. Sources of funds may be federal, state, and/or private.

OBJECTIVES

1. By September, 1976, the Illinois Office of Education, in cooperation with landscape experts, will initiate the development of guidelines for improving school landscapes.

2. By January, 1977, the Illinois Office of Education will have worked with the Advisory Board for School Facilities to review existing building codes. Guidelines should be developed that require active usage programs of existing resources before additional monies will be provided for acquiring additional resources.

3. By January, 1977, the Illinois Office of Education will work in cooperation with the Capitol Development Board to plan for regular maintenance and construction of schools which are more environmentally efficient.

4. By January, 1977, the Illinois Office of Education will urge all school districts to develop plans for improving school sites and making them more usable for instruction.

5. By January, 1977, the Illinois Office of Education will have urged schools to review existing policy statements that may tend to restrict the use of school sites and community resources for educational purposes.

6. By June, 1977, the State Superintendent of Education will ask legal counsel at state levels to examine existing laws and make specific recommendations for change that will actively encourage the use of community resources in day-to-day class activities. In particular, the enabling acts of the Park and Forest Preserve Districts, Conservation Districts, Soil and Water Conservation Districts, etc., will be reviewed to learn in what ways they can actively support environmental education programs. This will be done in cooperation with the appropriate officers of the groups and associations that are directly concerned with these districts.

CONTINUING EDUCATION

Human beings are the only species with the ability to understand their relationship to other things. In spite of this, too few of us are living in harmony with the environment. The goal of continuing education is to help us to better understand the environmental implications of our decisions and behaviors.

DISCUSSION

Adults are being asked to make important decisions and to take action on environmental issues with insufficient information and without verified knowledge. Programs of continuing education must be provided in order to develop the attitudes, knowledge, values and skills that are required if adults are to responsibly contribute to decisions on issues within both the immediate and total environments.

Adults should be made aware of the tremendous impact they have upon the environment. Further, adults must understand their effect as a component of the biogeochemical environment before they can be expected to develop life styles that are in harmony with the environment.

Many adult-oriented organizations and youth-centered agencies, dependent upon adult leadership, lack leaders with the environmental awareness and knowledge needed for responsible group participation. Therefore, a broad environmental education program is needed.

The Illinois Office of Education shall play an important role in the development and coordination of continuing education programs to assist adults in understanding the relationship of human beings and their environment.

OBJECTIVES

1. The Illinois Office of Education, in cooperation with the Board of Higher Education, shall continually assist in the implementation of the Master

Plan for Higher Education in Illinois.

2. The Illinois Office of Education, in cooperation with the Department of Higher and Continuing Education and the Adult Education Unit, shall continually assist all local agencies with adult education programs to develop environmental courses consistent with the Master Plan for Higher Education in Illinois.

3. The Illinois Office of Education will continually seek out and encourage the private, public, and governmental agencies to offer in-house, in-service programs on understanding the environment and environmental issues.

4. By April, 1976, the Illinois Office of Education will have cooperated with the Department of Conservation to consider the possibility of establishing joint projects such as environmental family camping, landscape reading tours, wildlife recognition week, and photo safaris.

5. By September, 1976, the Illinois Office of Education will have designated a committee to study means for providing (purchase, rental, producing) an environmental education ITV program series.

6. By May, 1977, the Educational Consultant responsible for environmental education will have cooperated with the Vocational and Adult Education Department to develop program formats for use in local service organization sessions dealing with the fundamentals of environmental awareness.

7. By September, 1977, the Educational Consultant responsible for environmental education in cooperation with the Vocational and Adult Education Department, will develop with local vocational education units, programs placing emphasis on environmental studies within specific vocational education courses.

These studies will deal with the impact of the vocation, or vocational area, upon the environment and with ways of performing the vocation or craft so as to have a minimum of environmental impact.

EVALUATION

The specific evaluation instruments used in conjunction with the State Plan for Environmental Education will be determined by the investigators and materials involved. The following general guidelines should pertain:

a. Evaluation should be consistent with the objectives stated in the Plan.

b. Although evaluation efforts should relate directly to studies of the status of environmental education in Illinois, they should make use of other studies when feasible.

c. Evaluation of the various activities undertaken to implement the plan should be repeated at regular time intervals and should include validation of instruments and analysis of trends.

d. Evaluation efforts should be directed not only toward materials, methods, and situations which exist, but also toward future improvements.

DISCUSSION

Specific Examples of Evaluation

Each section of the State Plan deals with activities which can be enhanced by continuing evaluation and by modification of programs and materials based on such evaluation. The following are examples of specific evaluation efforts which should be undertaken:

I. Baseline inventory of individual environmental awareness.

By assessing the depth of environmental awareness which individuals possess, we will obtain benchmarks for viewing the results of our collective environmental education efforts and gain insights into those areas of environmental awareness in which individuals are most deficient.

II. Baseline inventory of individual environmental attitudes.

By ascertaining the extent to which various environmental attitudes prevail, we will obtain benchmarks for viewing the results of our collective environmental education efforts and gain the input necessary to assess the degree to which attitudes are correlated with behavior.

III. Development of an instrument for assessing the quality of environmental education materials and their relevance to the State Plan.

IV. Inventory of existing environmental education centers willing to participate in various evaluation procedures.

V. Long-term study of trends in individuals' environmental knowledge (continuous at five-year intervals).

VI. Long-term study of trends in individuals' environmental attitudes (continuous at five-year intervals).

Both of these studies (V and VI) are designated follow-up studies (See I and II) in order to ascertain the effectiveness of the State Plan implementation.

VII. Analysis of Illinois legislation and recommendations for changes which would be more conducive to ecologically-sound behavior on the part of all publics.

This evaluation effort is intended to determine possible improvement in current laws and possibly new laws which should be enacted. The underlying assumption is that most of our current laws are not ecologically-oriented.

VIII. Evaluation studies of environmental education programs conducted at the local level.

OBJECTIVES

1. By June, 1976, the Illinois Office of Education will seek the cooperation of the Institute for Environmental Quality in the funding of research and evaluation projects.

2. The Illinois Office of Education will continually solicit the cooperation of concerned individuals, agencies, and institutions in developing and designing specific evaluation studies.

3. The Educational Consultant responsible for environmental education will annually revise the environmental education program questions used by the School Approval Section of the Illinois Office of Education.

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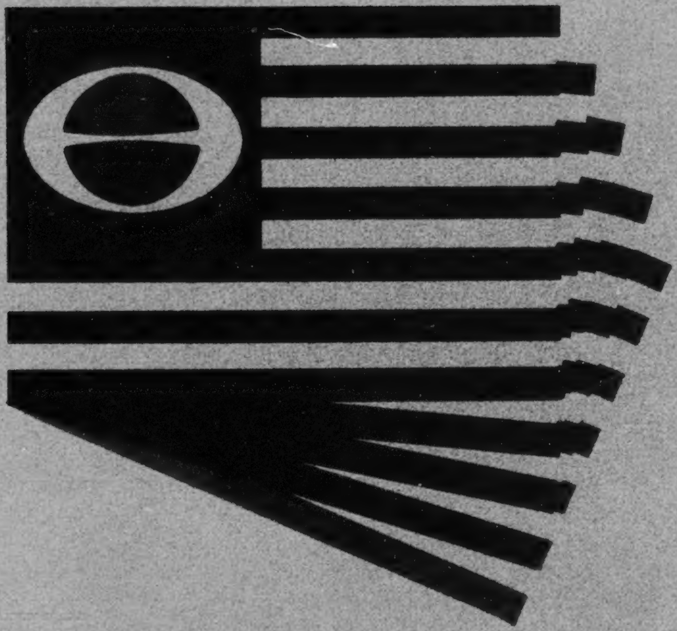
HOW TO GET STARTED



The following is suggested as a generalized scheme for implementing environmental education in the school program.

STEP I: DESIGNATE A LOCAL ENVIRONMENTAL EDUCATION COORDINATOR.

The local coordinator should have these basic duties:

a) coordination of local district environmental education efforts

b) development (in cooperation with the appropriate persons) of a school district environmental education plan that fully meets the spirit of the legislation and the environmental education needs of the locality

c) development and interpretation of budgets for personnel and programs

d) providing leadership, inspiration, and direction for the District Environmental Education Committee.

Other activities would fall into these three areas:

a) teacher preparation -- including organization of in-service programs, workshops, institute programs, and the coordination of appropriate courses by colleges, universities, and private agencies

b) curriculum development -- including the development of the district curriculum plan, identification of appropriate resources, and assisting teachers to utilize the resources.

c) consultant services -- such as (1) serving as a consultant to teachers, classes and buildings within the local school system, (2) arranging for consultants from various agencies to assist with instruction and field trips, and (3) maintaining lists of local citizen consultants and resource persons.

Perhaps one of the most important responsibilities of the District Coordinator is that of establishing an Environmental Education Committee composed of faculty representatives from each of the buildings, school administrators, students, support personnel in the schools, and key citizens. This committee should assist in meeting his or her responsibilities.

STEP 2: ORGANIZE AN ENVIRONMENTAL EDUCATION COMMITTEE CHARGED WITH THE RESPONSIBILITY FOR PLANNING, IMPLEMENTING, AND ASSESSING THE PROGRAM.

I. Who should be on the Committee --

Educators and resource people who can provide ideas and help to enhance the development of quality school programs. Potential members are:

1. Local Environmental Education Coordinator
2. Education Service Region superintendent
3. School district superintendent
4. Principal
5. Curriculum directors or supervisors
6. Elementary and secondary teachers
7. County extension agents
8. Resource agency personnel
9. Private organization personnel
10. Community organization representatives
11. Park and recreation district representatives
12. College representatives
13. News media representatives

II. How to organize a local Committee --

1. Invite several key educators and resource people interested in a program to meet to discuss the possibility of local committee.
2. Set up the planning committee to conduct an organizational meeting.
   - a) Make a list of possible members.
   - b) Develop an agenda, time, and place.
   - c) Secure an outside resource person who has had experience in developing such a program.
3. Hold meetings and discuss needs and concerns -- record.
   - a) Appoint a chairman and secretary.
4. Plan a second meeting one month later and decide on the first project. (Short, easy, and assured of success.)

5. Implement the first project -- with news coverage.

6. Continue monthly meetings.

7. Continue to work with schools.

8. Have one or two activities involving the public each year.

III. Suggested Activities for the Committee --

A. Environmental Learning Areas

-- List major resources and topics to be considered
-- Assist schools with assessing and developing outdoor classrooms
-- Plan and develop on-site schoolyard classrooms.

B. Teacher Training

-- Plan and implement teacher workshops and other in-service activities
-- Disseminate information on workshops and scholarships
-- Collect and organize materials and audiovisual aids available to teachers
-- Gather and disseminate information about local resources and people for use in environmental education.

C. Curriculum Integration

-- Assess major problems in planning
-- Collect and evaluate curriculum materials available
-- Disseminate literature to school libraries
-- Exchange information about local environmental education activities
-- Develop and disseminate teaching materials and activities
-- Assist decision-makers in determining what is needed, what is to be done, and the extent to which it is effective.

D. Educational Tours

-- Establish native trails and other teaching stations
-- List tours both private and public available to educators
-- Organize local tours of community areas available to classes.

Environmental Education Councils

Educators and other interested citizens in the Educational Service Regions are encouraged to establish Educational Service Region Environmental Education Councils.

The ESR Environmental Education Council should consist of the Regional Environmental Education Agent, the Environmental Education Coordinator from each school district, teachers, administrators, interested persons from local organizations, and other concerned citizens. The activities and responsibilities of the

ESR Council may range from the operation and governance of an Environmental Education Center to the sponsorship of teacher education programs.

STEP 3: WRITE PROGRAM GOALS AND OBJECTIVES TOWARD WHICH THE ACTIVITIES WOULD BE DIRECTED.

The committee should consider the following:

a) What are the available community resources-materials, places, and people?
   (Perhaps an inventory of each would be useful)

b) What do you wish the children to know or be able to do after instruction?
   (Examine existing materials and other programs for ideas)

c) What are some local issues and alternatives which you may use to help students clarify their values and behaviors?
   (Involve students in local issues and problems)

The curriculum guidelines and resources sections of this handbook should provide assistance in completing this step.

STEP 4: ESTABLISH THE CURRICULUM; INCLUDING THE PHILOSOPHY, CONCEPTS, PROCESSES, LEARNING MODELS, AND GUIDELINES.

As an aid in curriculum planning, the Illinois Task Force for Environmental Education has identified five broad themes, which cross content areas and, therefore, should be used as the program outline around which interdisciplinary activities may be clustered. These are detailed in the State Plan and Curriculum Guidelines Sections of this Handbook.

STEP 5: IMPLEMENT A CONTINUOUS IN-SERVICE TEACHER EDUCATION PROGRAM.

In developing and implementing an in-service program, the Committee should consider:

1. Local community colleges and/or universities for people and other resources
2. Cooperative efforts with other districts

3. Human and/or printed resources available from agencies and organizations
4. Frequency and duration of meetings, appropriate topics, problems
5. Degree of administrative support (e.g., released time?)
6. Who should be responsible for coordinating and implementing the program?

STEP 6: DEVELOP EVALUATION INSTRUMENTS AND PROCEDURES TO MONITOR THE PROGRESS AND DIRECTION OF THE PROGRAM.

It is important that program evaluation be continuous and systematic. Participants should have opportunities to formally and informally evaluate the on-going program. The program should be flexible so that changes, suggested by the evaluation effort, may be readily incorporated.

The most important source of evaluation data is the classroom. If that which was learned during the in-service program has little effect upon classes, perhaps the in-service program was somewhat less valuable than intended.

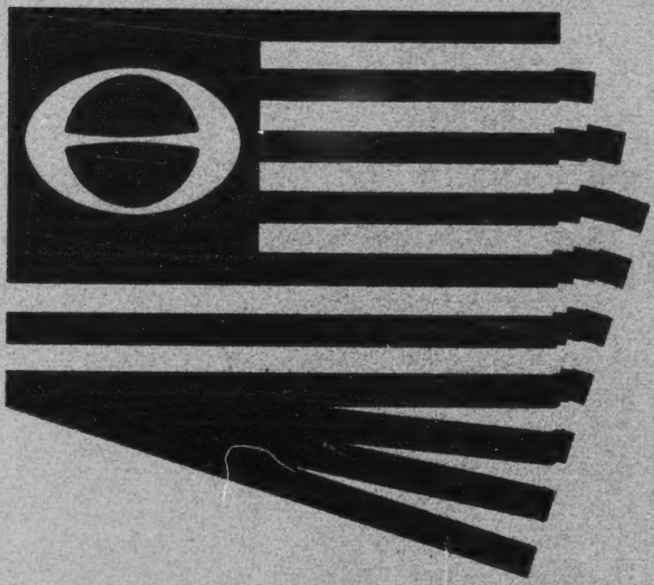
Constraints and their Elimination

Many constraints will impede development and implementation of quality environmental education curricula. Some of these are identified below with possible ways of removing them.

Constraints	Suggested methods of Elimination
1. Teachers' reluctance to engage in environmental education	- give teachers instructional materials that are practical for their teaching situation and guidance in how to use them - encourage teachers to prepare themselves for effective environmental education by offering appropriate self-enrichment opportunities and incentives
2. The curriculum, especially at the elementary level, already seems overcrowded	- integrate environmental education with other subjects at the elementary level including reading, mathematics, social studies, health, science, and art
3. Many teachers and other community leaders do not have adequate background to be effective environmental educators	- provide in-service workshops - encourage and support graduate study in environmental education for teachers - encourage independent study and field work within the local school district

4. Teachers are unable to select from the plethora of commercially available materials for environmental education	- the committee, with the possible aid of outside consultants (e. g., Illinois Office of Education), could offer considerable assistance to the classroom teacher
5. Field trips are sometimes costly and difficult to arrange; perceived legal and time constraints further complicate this issue	- utilize walking field trips on the school site and in the neighborhood - develop the school site as an outdoor resource - remove unnecessary "red tape" that prohibits field trips
6. Separate courses inhibit focus on multidisciplinary environmental problems	- integrate subject matter at the elementary level - develop the school site as an outdoor resource - develop problem-centered courses at the secondary level using the school and its organization as one of the foci of study
7. Locally oriented instructional materials are lacking	- county councils, local districts, park districts and other agencies should support the development of resources and instructional materials that are oriented to local problems and resources - acquaint teachers and district personnel with sources of available funding for for development of locally oriented materials - acquaint teachers with existing and newly developed materials that demonstrate local orientation
8. Many teachers and administrators do not value extra-classroom and field experiences as highly as in-class work	- objectives and means of evaluating extra-classroom experiences should be specified so that evidence of the importance of this activity can be presented
9. Many pupils cannot relate to the natural environment	- outdoor experiences including, to the degree possible, resident experiences for children from urban areas - children should have experiences outside of school that are integrated with classroom experiences and articulated across grade levels

CURRICULUM GUIDELINES



People now have the scientific and technological "know-how" to solve many environmental problems; but decisions regarding man's use of his environment seldom are based on purely scientific knowledge. Most human decisions are based on custom, oversight, economic feasibility, political expediency, social desirability or religious belief. Wise decisions cannot be made about the environment without an understanding of economics, political science, sociology, psychology and the humanities, as well as the natural sciences. This calls for a new educational approach termed environmental education.

Prior to discussion of curricular development in any given area, the area must first be defined. The Environmental Education Act of 1970 (Public Law 91-516) provides this definition:

> Environmental education means the educational process dealing with man's relationship with his natural and man-made surroundings, and includes the relation of population, pollution, resource allocation and depletion, conservation, transportation, technology, and urban and rural planning to the total human environment.

Curriculum planning is a complex process which involves deciding what is to be taught and how it can be taught most effectively. The task of curriculum planning for environmental education is, in many ways, more difficult than the task of planning a curriculum for one of the standard school subjects. Mathematics, science, or social studies each has a disciplinary basis which can serve as a guide in deciding what should be taught in schools. Environmental education is concerned with broad problems rather than with disciplines. The subject matter of environmental education includes those activities of people which have significant favorable or unfavorable environmental impact. Examples of these are: air pollution, heavy metals, energy supply and demand, transportation, recycling and solid waste disposal, noise pollution, the effects of excessive use of pesticides, preservation of wilderness areas, forest management, protection of wildlife, and human settlements, value, and behavior.

The content areas may be treated with varying degrees of sophistication, depending on grade level. The following guidelines, based on Section 2 of the State Plan, should be employed in developing curricula in environmental education.

1

Since environmental education is multidisciplinary, it should be integrated into all school subjects. A means of integrating environmental education into all school subjects is through the use of conceptual themes which pervade the entire curriculum. The following broad themes and sample objectives have been identified as an aid to curriculum planning: *

Theme 1. INTERDEPENDENCE

Understanding the interdependence of living and non-living things is fundamental to understanding and appreciating ideas related to other themes. One cannot appreciate the significance of human impact on the environment, the need for maintenance of our world, ideas related to the quality of life or issues related to its improvment without first comprehending the interconnectedness of our world.

In the primary grades, children should be introduced to the concept of interdependence. They should learn how people depend on each other and on animals, plants, soil and the sun for survival. In an environmental context, primary school children can learn that their dependence on living and non-living things is simply one of myriad of interdependences that occur on earth.

By the end of third grade, students should be able to:

a) Give examples of ways people in their community depend on each other.
b) State ways in which people's actions affect the lives of other people.
c) Give examples in which living things depend on each other for life.
d) Understand that living things adapt to their environment.
e) Identify the kinds of animals and plants that populate an area and describe why they live there and why others do not.

In the intermediate grades, children should clarify this concept and increase the technical depth of their understanding of it. They should learn about natural cycles, food webs and factors which affect animal and plant populations. They also should learn more about diversity in the natural world and its importance.

By the end of the sixth grade, students should be able to:

a) Describe natural factors tending to limit populations of animals and plants.
b) Describe the O_2-CO_2, water and nitrogen cycles and indicate how each is essential to the continuation of life.

(*At the secondary level, courses specializing in environmental studies are appropriate. The presence of one, or a series of environmental courses, cannot, however, substitute for the environmental orientation that should be given to all teaching. Furthermore, curriculum planners and career personnel should give full consideration to manpower needs and to preparing students for environmental careers.)

c) Give examples of natural food webs and predict what will happen if an element in a food web is changed.
d) Understand that all living things modify their environment by taking material for life from it.
e) Appreciate diversity among living beings and value the diversity for both its beauty and as an assurance of survival.

In junior high school, students should further clarify concepts related to interdependence. They should be introduced to mechanisms of the natural processes that underlie interdependence and given some appreciation of the limits of our knowledge. Clarification of values is an important aspect of the junior high school years.

By the end of junior high school, students should be able to:

a) Describe and give examples of biological, economic and social interdependence of living and non-living things, including people.
b) Explain the O_2-CO_2, water nitrogen and other biogeochemical cycles and state how each is essential to the continuation of life.
c) Give examples of natural food webs and hypothesize the outcomes when niches are diminished or increased in excess of natural levels.
d) Formulate a value set in which respect for the natural environment is fundamental.

In senior high school, the focus is on synthesizing ideas about interdependency and developing skills needed for appropriate action as citizens. Students should be aided in synthesizing both conceptual and value structures as bases of significant action.

On completion of high school, students should be able to:

a) Understand that all living things modify their environment, but the process of natural selection, which does not operate fully for humans, tends to minimize the destructive impact of species on the environment.
b) Understand that earth is a finite system and describe several implications of this fact.
c) Understand, since earth is a finite system, that resources must be reused and that reuse requires energy.
d) Exhibit behavior consistent with their values concerning the natural environment and its diversity.

Theme 2. IMPACT

Because of our numbers and our technology, people are capable of modifying the environment, not only to the extent of changing the character of the landscape, but by altering some of the natural cycles essential to life. Growing from the concept of interdependence is an understanding of the significance of human impact on natural cycles.

In the primary grades, children possess some awareness of the impact of people on the environment. The task of primary teachers becomes that of extending children's awareness of the reasons people develop technology and of the beneficial and detrimental effects of this technology.

By the end of third grade, students should be able to:

a) Understand that people depend on natural cycles for existence.
b) Give examples of ways in which people have applied technology to change natural balances.
c) Describe how inventions have affected the number of people who can live in an area and the effects of these inventions on the environment.
d) Understand that some materials can be changed, reused, or be made unusable; but that many such changes require energy.
e) Describe how inventions often result in greater consumption of resources.

In the intermediate grades, children should broaden and extend their ideas about people's impact on the natural systems. They should learn about the causes and consequences of pollution -- a product of the goods and services they require for survival and comfort. They should formulate values concerning their own needs and the needs of other living beings.

By the end of sixth grade, students should be able to:

a) Recognize that people are more able to change their environment than other living things, and that because they have intelligence, they have very important responsibilities.
b) Describe and give examples of the effects of technology and industrialization on human consumption of materials.
c) Discuss different points of view regarding the relationships of people to other living organisms.
d) Identify sources of pollutants and demonstrate how some forms of pollution can be detected or measured.

In junior high school, students should examine the changes people have brought about. In addition, they should learn to distinguish between reversible and irreversible changes. They should also be assisted in clarifying values related to altering the world.

By the end of the junior high school, students should be able to:

a) Understand that most material goods which people consume are produced at some cost to the natural environment: (1) consumed renewable resources; (2) consumed non-renewable resources; (3) pollution effects due to production; and (4) pollution effects attributable to waste disposal.
b) Understand the sources of common pollutants and how some forms can be detected and measured; perform some simple tests to measure environmental pollution.
c) Recognize that we do not fully understand the effects that people have on the environment or the effects of the environment on people.
d) Formulate value sets that consider consequences of the use of the natural and constructed environment.

In senior high school, students should continue to clarify concepts from the biological, physical, and social sciences, as well as the humanities, relevant to human impact on the environment. They should be helped to synthesize these ideas into appropriate values. They will then be more able to take effective action as citizens of our society.

On completion of high school, students should be able to:

a) Describe alternative points of view regarding the relation of humans and other living things; state implications of each alternative.
b) Give examples of ways in which people have altered natural cycles and describe some of the consequences.
c) Understand the sources of common pollutants and perform some sophisticated tests to measure environmental pollution.
d) Describe and explain the causes of various population concentrations found in urban, suburban, rural, and wilderness areas and the advantages and disadvantages of each to humans and to the environment.
e) Understand that most humans depend on technology for survival; that without technology, human population would drop sharply.
f) Formulate a value set which considers, prior to action, the consequences of alternative actions.
g) Recognize that unexpected consequences often result from a course of action -- that our knowledge is incomplete: hence all consequences cannot be predicted.

Theme 3. MAINTENANCE

Natural environments tend to be self-renewing because of the continued input of solar energy and other natural cycles. Things built by people, on the other hand, tend to degrade with the passage of time unless energy is expended to maintain them. Our houses, cars, clothing, and other possessions need to be maintained, otherwise they deteriorate and become unusable. Our cities, villages, and other constructed environments need continual care. Replacement means use of more natural resources.

In the primary grades, children can be introduced to this theme in the context of their classroom, their toys, desks, and their personal possessions. In each case, disorder increases unless energy is supplied to restore order. Children can also learn that maintenance is never-ending; but that it is important to keep our possessions longer and looking better.

By the end of the third grade, students should be able to:

a) Recognize that it takes energy to maintain an orderly environment: appreciate that they should care for those things they possess.
b) Demonstrate a positive attitude toward the need for maintenance.
c) Exhibit behavior which helps maintain their personal environment.

In the intermediate grades, children's concepts of maintenance should be extended beyond their own possessions to the larger environments of home and community. Children should learn about the need for maintenance of all parts of the constructed environment. Moreover, they should be helped to develop positive values about care of the constructed and natural environments.

By the end of sixth grade, students should be able to:

a) Recognize that environments modified or built by people require continual maintenance.
b) Appreciate the time and energy needed to maintain an orderly environment and recognize that the total cost of any environmental modification must include the cost of its maintenance.
c) Understand that resources, both renewable and non-renewable, should be used wisely.

In junior high school, students should learn more about the costs of maintenance and why many constructed environments are not maintained. In addition, they should encounter problems of maintenance in their own school, home, and community.

By the end of junior high school, students should be able to:

a) Appreciate that natural environments are largely self-renewing; that is, solar energy and natural cycles initiate a natural succession of renewal.
b) Understand that unless outside energy is applied to reverse the tendency, any system will become increasingly disordered.
c) Recognize that every person has responsibilities to himself, other humans, and the total environment.

In senior high school, students should broaden concepts related to environmental maintenance in studies of economics, political science and other social sciences and they should be assisted in the synthesis of these concepts in order to be prepared to take effective action as citizens in our society.

On completion of high school, students should be able to:

a) Identify governmental regulations that harm or protect the environment.
b) Make decisions based on long-term environmental benefits rather than short-term economic gains.
c) Exhibit behavior which helps to maintain the total constructed and natural environment.

Theme 4. QUALITY OF LIFE

The quality of life of all living things is dependent on the quality of the environment. How we appraise the quality of life depends on our values, but the environment in which we live affects how we feel and act toward ourselves and others.

In the primary grades, children should learn of the needs people have for food, clothing, shelter, and respect of peers and self. They should learn that as people try to meet their needs, they can harm the environment. Further, they should realize that food, clothing, and shelter are not the only essentials of a quality life.

By the end of third grade, students should be able to:

a) Recognize that people not only have need of food, clothing, shelter, and safety, but also need respect and love from others and for themselves.
b) Understand that inventions help to keep people healthy, produce more food and make more comfortable places in which people may live.
c) Recognize that people are better able to meet basic needs because of inventions, but not without possible harm to the environment.
d) Begin to understand the meaning of quality of life.

In the intermediate grades, children should learn about the effect of environment on people and begin to formulate a tentative definition of quality of life.

By the end of sixth grade, students should be able to:

a) Recognize that people are better able to meet basic needs because of technology, but this has some very harmful environmental effects.
b) Understand that the quality of life for most people is significantly affected by the quality of the constructed environment.
c) Assess their values and formulate a tentative definition of quality of life.
d) Express values related to themselves, others and the natural environment.

In junior high school, students should acquire more sophisticated concepts to help them understand the relationship of environment, values and quality of life. They should be helped to gain a respect for the environment as part of their developing values.

By the end of junior high school, students should be able to:

a) Give examples of how urbanization and industrialization have enhanced or impeded satisfaction of higher order needs, e.g., love, self-esteem.
b) Explore the reasons for the existence of the constructed environment, its diversity, strengths and weaknesses.
c) Appreciate that psychological well-being and aesthetic values can be derived from the natural and the constructed environment; understand that environment may also have undesirable effects on psychological well-being.
d) Express values in which quality of human life, quality of the environment and personal values are related.
e) Become sensitive to, and active in, relieving social problems.

In senior high school, students should be helped to synthesize ideas and values from diverse disciplines so that achievement of quality of life becomes a central goal of action.

On completion of high school, students should be able to:

a) Describe human motivations, beginning with basic needs of survival and leading up to higher order needs such as the need for a feeling of worth.
b) Understand that human survival needs, including health, food and shelter, have been satisfied with increasing effectiveness through the applications of science and technology and the development of social institutions.

c) Understand that most gains in meeting survival needs have been achieved with negative impact on the natural environment and that science and technology must continue their efforts to minimize this impact.
d) Begin to formulate a value set in which quality of human life, quality of environment and personal values are interrelated; exhibit behavior which is consistent with the value set.
e) Act in a manner which improves the quality of life for themselves and other living things.

Theme 5. IMPROVEMENT

Improving the quality of life should be a central goal of our times. To progress toward this goal, we must know what it means, value it and then organize our knowledge and resources to bring about improvement. To make our lives better will not be easy. We must expend massive amounts of effort, brainpower, and money just to stabilize society. To improve the quality of our lives remains one of the greatest challenges of society. How successful we are depends upon our knowledge, values, and ability to organize resources.

In the primary grades, children should learn how people organize resources to solve problems. They should learn that government is one way that people attempt to solve problems They will develop an awareness of the need for changes in the way we do many things.

By the end of third grade, children should be able to:

a) Demonstrate awareness that laws and concern for the rights and needs of other people limit our ability to do what we want.
b) Understand that people form governments to do things which individuals cannot do alone.
c) Recognize that much of what we do does not lead to a better environment or quality of life.

In the intermediate grades, children should broaden their understanding of how to organize resources for solving problems. They should acquire problem-solving, information-gathering, decision-making, and planning skills in a context of environmental situations. In addition, they should be encouraged to develop values and attitudes consistent with improving the quality of our environment and our lives.

By the end of sixth grade, students should be able to:

a) Understand that local, state, and federal governments have developed laws and agencies to prevent and cope with problems.
b) Describe some ways that people can influence political processes.
c) Recognize that people's behavior is influenced by their values and their intellectual and physical resources.

In junior high school, students should acquire more sophisticated concepts of problem-solving, information-gathering, decision-making, and planning. These skills should be applied to real problems of environmental management.

By the end of junior high school, students should be able to:

a) Understand that, if all people are to be cared for, environmental changes must be planned before they are built.
b) Understand that many economic, social and political constraints influence our behavior.
c) Use the skills and techniques of problem-solving.

In senior high school, students should synthesize their knowledge and values so as to act effectively as citizens. They should be actively encountering real problems related to the quality of life and the quality of the environment.

On completion of high school, students should be able to:

a) Recognize that many of our current values, and consequent behaviors, are incompatible with maintenance of either a high-quality environment or a high-quality life,
b) Demonstrate a working knowledge of governmental processes and agencies that have been established to prevent, and cope with, environmental problems.
c) Demonstrate understandings and skills for using legal and political processes for minimizing detrimental influences on the environment.
d) Recognize that human modification of the natural environment should be done prudently and with careful consideration of alternatives and consequences, both immediate and long-range.
e) Understand that people must carefully control human and technological factors which tend to modify the environment, such as: population growth, consumption of resources, disposal of wastes, and alteration of biogeochemical cycles.
f) Understand some technological ways of reducing pollution, such as: tertiary sewage treatment, automobile pollution control devices, noise abatement devices, alternatives to internal combustion engines, smoke precipitation, materials recycling and use of solid wastes as sources of fuel or building materials.
g) Build a value set supportive of coordinated action and personal behavior to retard current rates of detrimental environmental modification.
h) Develop a life style which is ecologically defensible, especially with reference to: minimal consumption of resources, minimal interference with natural cycles, minimal production of wastes which are not biodegradable and maximum concern for all components of the ecosystem.

2

In addition to the curricular themes, the following aspects of a quality environmental education program should be considered:

1) Environmental education involves knowledge, attitudes, and skills which learners should experience directly. Both indoor and outdoor activities should be provided and should deal with issues and problems in, around, and beyond the local school and community.

2) Since environmental education is concerned with the development of attitudes and consequent changes in behavior, a wide range of instructional techniques should be used including role-playing, debates, and simulation games.

3) Since environmental education is designed to cause people to examine their values in relation to environmental concerns, such as quality of life and human relation to other species, instruction should involve open discussion of personal and cultural values, how these values have originated and how the values affect behavior.

4) Since environmental education cannot avoid the controversy inherent in environmental issues, instruction should capitalize on controversy by: (1) identifying the opposing positions and vested interests and examining the information which is the basis of the controversy, (2) specifying the values and motives of each interest group which result in their respective position, (3) evaluating alternative courses of action with respect to both immediate and long-range consequences for each of the interests, and (4) encouraging students to specify their own values and motives, take a position which is consistent with these, and defend their position from an environmental point of view.

5) Since environmental education is concerned with many problems and issues in, around, and beyond the school, there should be opportunities for parents and other community residents to participate in the many phases of planning, development, and implementation of the local program.

3

SAMPLE ENVIRONMENTAL EDUCATION CONCEPTS

Use of these conceptual statements and others in conjunction with the five themes should instill environmental education as the unifying thread of the entire educational process. The statements presented here do not fully encompass all themes.

An adequate supply of clean air is essential for life.

An adequate supply of clean water is essential for life.

Fertile soil is necessary for the production of food.

Living things depend on each other and on non-living things.

All living things interact among themselves and their environment, forming an ecosystem.

The basic function of any ecosystem is to capture and transfer energy.

Energy from the sun is converted by plants into a form that all living things can use for life processes.

The energy requirements of man are met by food, and men are dependent on other organisms for this food through food chains and food webs.

Diversity is one of the key factors in the survival of an ecosystem. Man oversimplifies many ecosystems, and thus weakens them.

Man modifies the environment in ways which alter natural biogeochemical cycles. Many species find it difficult to adapt to these new conditions.

Environmental factors are limiting on the number of organisms living within their influence, thus each environment has a carrying capacity.

Natural resources, in terms of both quality and quantity, are important to all living things.

Natural resources are not equally distributed with respect to land areas and political boundaries.

As population rapidly increases, competition for use of natural resources increases, resulting in the need for establishing priorities. Decisions must be based on long-term environmental benefits rather than short-term economic costs.

An understanding of scarcity is necessary to our understanding of the environment. Portions of the natural environment are either difficult to replace, or are irreplaceable.

In nature there is a continuous recycling of many elements. Man would do well to observe nature's example and recycle the results of his technology. This recycling might avert severe depletion of natural resources.

Individual actions, when compounded, may result in significant environmental alterations over time.

The individual must be primarily concerned with close personal environments. From personal environments, the individual can then move to relevant involvement with environments more distant in time and space.

Physical well-being is a fundamental necessity for a high-quality life. Ironically, man often places higher value on other things.

Man has exercised a presumed right to exploit the environment with little concern for his responsibility to preserve and share it.

Man presently faces the prospect of endangering his chances for a better life through the technological measures he employs to achieve it.

Environmental problems are caused by the clash of natural systems with man's cultural, social, economic, and political systems.

Environmental Education must be concerned with a future-oriented society and provide the stimulus for man to evolve new life styles in which natural systems and human systems can coexist harmoniously.

4

SOME BEGINNING ACTIVITIES

"How can I make my school a better place in which to live ?"

Just as planet Earth is an ecosystem, so can the school be seen as an ecosystem -- a place in which we live and learn and of which we are a part. Since the school is so much a part of a student's life, its entire operation should be familiar to him. An in-depth investigation of the essential activities and operations of the school is one approach to create a responsibility to and a caring for the school environment.

I. Energy Source Activities:

1) Learn about the heating and air conditioning system of the school.

2) Determine the fuels used in this system. What are their origins?

3) Where does the power originate which illuminates the building and runs the machinery? How was it produced? What are the environmental and economic costs?

4) List ways in which energy is wasted and can be conserved.

5) Examine some alternative energy sources which your school might consider.

II. Supplies and Materials:

1) Discuss where the supplies and materials used in the school came from and the ecological implications of their production and use.

2) What is done with them after use?

3) List ways in which these materials can be put to better use.

4) In what ways do we waste materials and how can we help keep the waste to a minimum?

5) Discuss alternatives in supply and material purchase and use.

III. Noise Levels:

1) Identify the sources of noise.

2) What are the effects of noise on students?

3) Record noise at different places in the school and compare noise levels.

4) How can we reduce unnecessary noise? Work to reduce it!

IV. Natural Surroundings:

1) How does plant life play a role in the school ecosystem? For example, consider noise, temperature, air quality, beauty....

2) What would it be like if there were no plants on the schoolground? -- More plants?

V. Maintenance Activities:

1) Study the effects of littering, window breakage, vandalism, etc.

2) How can students improve and protect the school environment?

VI. Waste Disposal Activities:

1) Talk with the custodian and find out where wastes produced by classrooms and elsewhere are taken.

2) Take trips to the dump and sewage treatment plant to learn what happens to waste products.

3) Determine the closest recycling and salvaging companies and contact them for information regarding possible pick-up from the school. Study the pros and cons of recycling programs.

4) Waste is something for which we have not developed a use. What are some possible uses for the waste materials produced by the school?

VII. Develop a "School Environmental Management" Plan

Since one of the best ways to teach appears to be that of providing an example, it is appropriate and only reasonable that schools be strongly urged to develop an environmental management plan covering the operation of the school. In the development of such plans, environmental impact should be one of the criteria employed in making school management decisions. Furthermore, the school operation should be in compliance with all state environmental regulations. Such a program might include: 1) reduced use of motor vehicles for transportation to and from school; 2) careful maintenance of school motor vehicles; 3) extremely careful use of pesticides, herbicides, chemical fertilizers, de-icing salts, and chemical plumbing substances; 4) reduction of noise levels; 5) reduction of crowding; 6) careful use of books and other materials; 7) proper maintenance of the heating plant; 8) conservative use of heating fuel, electricity, water and paper; 9) use of recycled paper; 10) use of returnable containers; 11) recycling of paper, glass, and metal; 12) proper disposal of any material which cannot be reused; 13) reduction of food waste in the cafeteria; 14) composting of waste food and other organic material for use as natural fertilizer; and 15) continuous cleaning and beautification of the school site.

5

ENVIRONMENTAL EDUCATION SELF-TEST

The following questions are currently used by the Illinois Office of Education to evaluate environmental education curricula for the purpose of state recognition of schools. To plan and/or evaluate your environmental education curriculum . . . ask yourself these questions.

PHILOSOPHY AND OBJECTIVES

1) To what extent does the school have a clearly defined philosophy of conservation and environmental education?

2) To what extent does the environmental education program promote an active concern in the community for seeking solutions to environmental problems?

3) To what extent does the program encourage the development of environmental improvement plans which focus on the close personal environments of home, school, and community?

4) To what extent does the school reflect concern for environmental management of its resources through its own daily operations?

PROFESSIONAL PREPARATION

5) To what extent are teachers encouraged to attend in-service workshops, institutes, or courses in contemporary approaches to environmental education?

6) To what extent are teachers given released time to attend professional meetings or in-service activities related to environmental education?

7) To what extent are teachers given released time to work on developing new curriculum materials for environmental education?

PROGRAM

8) To what extent are environmental concepts and activities integrated into the entire curriculum in Grades K-12?

9) To what extent does the school make use of exit-level developmental learner objectives?

10) To what extent does environmental education stress the interdependence of natural and cultural systems?

11) To what extent do environmental education courses utilize community resources?

12. To what extent does environmental education encompass urban, suburban, and rural environmental systems?

13. To what extent does environmental education consider the relationship between population growth and food production?

14. To what extent do students examine the relationship between environmental problems and consumer demands in an industrial society?

15. To what extent does the environmental education curriculum explore the relationships between industrial production and resource depletion and pollution generation?

16. To what extent are students given the opportunity to consider the career possibilities in various environmental fields?

17. To what extent does environmental education curriculum make use of science fiction as a means of exploring the unconventional in preparation for future living conditions?

18. To what extent are students given the opportunity to become actively involved with individual and/or group environmental projects?

19. To what extent are environmental education activities made available through the school's extra-curricular program?

MATERIALS AND EQUIPMENT

20. To what extent does the professional library contain adequate holdings to enable teachers to prepare for teaching environmental topics?

21. To what extent does the student library contain adequate holdings to enable students to complete projects and read for pleasure on environmental topics?

22. To what extent are audiovisual aids, e.g., films, filmstrips, slides, natural field materials, instructional TV, etc., available for use in environmental education?

ROOMS AND FACILITIES

23. To what extent do environmental education classrooms reflect a concern for environmental quality?

24. To what extent does the environmental education program provide learning experiences which make use of all five senses?

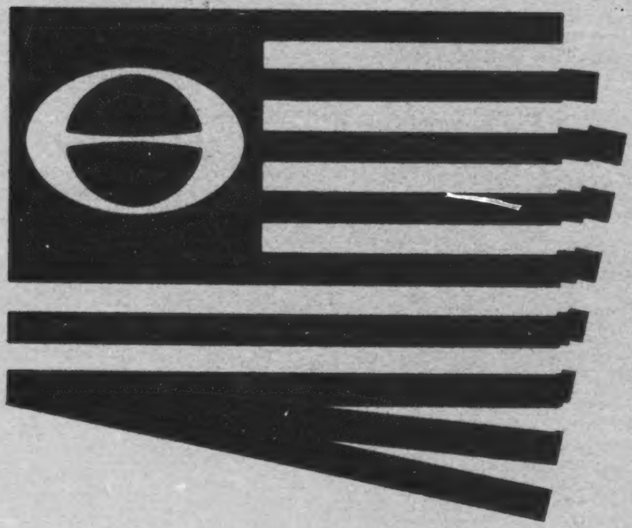
25. To what extent does the environmental education program utilize the natural and human-made resources of the school site?

26. To what extent are qualified environmental education consultants utilized?

27. To what extent is the County Environmental Education Council involved in the program?

28. To what extent is the District Environmental Coordinator effective in promoting and maintaining the program?

SAMPLE TEACHING UNITS



FOREWORD

Environmental education is a multi-disciplinary approach to the study of man's relationship to his natural and man-made surroundings including the relation to the conservation of natural resources, pollution, population growth and distribution, food production, energy demands, transportation, recycling and solid waste disposal, noise pollution, preservation of wilderness areas, technology, and rural and urban development.

It attempts to create a citizenry that understands ecological principles and environmental problems taught through discovery and issue-oriented methods, and uses local examples. It fosters understanding not only of the external environment, but also of the inner environment of the person. The formation of an attitude of responsibility for the environment, an "environmental ethic," is mandatory.

The environmental education teaching units in this section were assembled to promote the above conceptualization of environmental education. The units result from a series of writing conferences sponsored by the Illinois Institute for Environmental Quality and are designed to be activity-oriented. You may wish to use considerable reading materials to supplement the units.

Teachers are also encouraged to submit their own units to the Environmental Education Specialist in the Illinois Office of Education for possible inclusion in this series.

Illinois Office of Education
100 North First Street
Springfield, Illinois 62777

Dr. Lance E. Bedwell
Educational Specialist
Environmental Education

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Home and community survey -
an activity designed as a term project 4

UNIT 1 :

INTERACTIONS WITHIN THE PHYSICAL AND BIOLOGICAL ENVIRONMENT

B Y
MAURICE KELLOGG
Western Illinois University

HELEN McCLAIN
Chicago Public Schools

WENDELL NELSON
Princeton Public Schools

GRADES 1-3 SUBJECT(s) ________

RATIONALE

Change is inevitable. Changes, both in the living and non-living environment, although often subtle, are nevertheless discreet occurrences reflecting interactions between environmental components. Some interactions are at the level of a simple cause-and-effect relationship, while some change can be attributed to a complex network of interacting variables. Some interactions promote changes that are detrimental to the environment while some interactions have positive consequences and may result in a renewal effect.

It is important that younger children recognize the variables within the environment that may contribute to change and interpret change in terms of the responsible agent. Direct opportunities to observe and measure change are essential in developing a meaningful understanding of the interacting environment.

CONCEPTS

1. Living things require special habitats.
2. Organisms interact with their environment.
3. Living organisms may have a renewal effect upon the physical environment.

OBJECTIVES

(SET A)

Upon completion of this unit, students should be able to:

1. Identify the components of a habitat and associate it with a place where an organism lives.
2. Describe diverse habitats of organisms ordinarily found in the school environment.
3. Associate unique habitat characteristics with specific organisms.
4. Identify interacting physical conditions in the environment -- light, temperature, moisture, wind, soil types, topography, and relate their influence to living things.

5. Measure changes in physical conditions over a given period of time.

6. Identify specific environmental factors that affect an organism's ability to live in a community.

7. Describe the growth responses of organisms under differing environmental conditions.

(SET B)

1. Identify some animals that prey upon other animals.
2. Identify animals that feed upon plants.
3. Use the term "population" to refer to a group of plants or animals of one kind in a particular area.
4. Explain that the size of a population relates to the balance between birth and death.
5. Cite examples illustrating that the size of a population can increase or decrease depending upon environmental influences.
6. Identify the food relationships among plants, plant-eaters, and animal-eaters, as a food chain.
7. Recognize that all food chains begin with plants.
8. Use the term community to refer to the populations of plants and animals in a particular area.

(SET C)

1. Identify stages of decomposition of an organism, plant, or animal, as it becomes a component of the soil.

2. Identify detritus as a product of the life process of organisms and associate it as a source of soil enrichment.

ACTIVITIES

(SET A)

1. Living things require special conditions for growth. This can be illustrated best in the natural environment, but can also be represented in the classroom through the use of woodland terreria, desert terreria, plants growing in a sunny window or a shaded window, etc. Children can best establish relationships between an organism and its environmental needs by direct observations and investigations. When seeds are planted, what do they need to germinate and grow? Where will they be placed? Where are mosses and ferns placed in the classroom?

2. Using some of the materials listed (and others that may be appropriate), discover as much as you can about an area in the immediate school environment. Where is it warmest and coolest? Where is soil the driest and wettest? What portion of the area is exposed to the most shade each day? What portion is exposed to the most sunlight? The explorations should be open-ended and should encourage creative investigations; the following list includes items which can be used in these investigations:

String
Sticks
Thermometer
Pencils
Spoon
Sieve
Paper
Tape Recorder
Magnifying Glass
Camera and Film

3. In a local park, or natural area, compare the types of plants growing in different areas -- an open space, a ravine, a south hillside, and a north hillside. Were plants found in some areas and not in others? Were some areas more moist? Were some areas more shaded? Were some areas more protected from the wind?

4. Explore the environment to find two things -- one of which is dependent upon the other. Find cause and effect relationships in which one population is increased or decreased.

5. Explore the environment and observe indirect evidence of a population of something. Discover "footprints" of a population that should be increased, and one that should be decreased.

6. Investigate the environment and discover how some living thing in your environment changes.

(SET B)

1. Populations of organisms increase or decrease depending upon the establishment and maintenance of the environmental interactions that sustain life. Young children need to move from a point of awareness of the individual organism with its specific characteristics toward the point of viewing the individual as part of a number of such individuals referred to as a population. The destiny of an individual and a population may or may not be in harmony; an individual tree may die, but the total tree population may be on the increase. Examine the immediate school environment and discover the "predators" and their "prey" in the community. What would happen if these relationships were changed?

2. Discover something in the immediate environment that is increasing in number and something that is decreasing in number and attempt to prove it. Are the increases or decreases good or bad? Do some things always increase, while others always decrease?

3. Plant wheat, rye, or grass seed in a terrarium to develop a specific plant population. Introduce crickets into this new environment. Is there any change in the plant population? If conditions are suitable for the crickets, will there be any change in their population? Introduce a chameleon into the terrarium; will this influence any of the existing populations?

(SET C)

1. Organic wastes and organisms that die remain part of the environmental system. Children can be provided an opportunity to view the decay of organic material and the use of organic wastes as mulch and fertilizer. View natural decay of logs, leaves, or other organic material under natural conditions if possible, or create such conditions within the school environment.

2. Set up an aquarium and observe the relationships of the organisms. Waste material will be noticeable. Through inquiry, see if the children can identify the source and implications of such waste material. In cleaning the aquarium, could the detritus be saved and used to fertilize plant growth? Could the litter from an animal cage be used in a similar manner? Could manure from other animals be used experimentally with a potted plant to compare growth?

UNIT 2 :

ENERGY FROM FUELS

BY

JAMES GALLAGHER
Governors State University

BARBARA DRIESNER
Collinsville Public Schools

DONNA SCHMIDT
Northern Illinois University

GRADES 4-6 SUBJECT(s) ______

RATIONALE

Most of the energy we consume comes from fossil fuels. Because of increasing demands and declining supplies we are facing a fuel shortage. This unit is designed to help children identify ways we use energy, the sources of energy, how to conserve energy and choices we must make about our energy use.

CONCEPTS

1. Most energy we consume comes from burning fossil fuels which are limited in supply.
2. People are using increasing amounts of energy to satisfy "essential" needs for food, clothing, temperature control and transportation; additional energy is used for our recreation, pleasure and comfort.
3. The increasing demand for energy and the limited supply of fossil fuels couple to make a long-term problem of great importance.
4. New sources of energy must be found, and made economically feasible.
5. Energy is needed to do work -- much of the energy we consume is wasted as heat.

OBJECTIVES

Upon completion of this unit, students should be able to:

1. Describe energy used in their own community to provide necessary food, clothing, temperature control, and transportation.
2. Identify and describe non-essential uses of energy in their community.
3. Identify the sources of energy used in their home, school, and community.
4. Read a gas and electric meter.

5. Measure the amount of energy used in their home and school; calculate and compare the amount of energy consumed by various appliances, such as -- air conditioner, clothes dryer, dishwasher, water heater, furnace, and vacuum cleaner.

6. Describe the reasons for the energy and fuel shortage and identify some ways alleviating it.

7. Describe changes in people's behavior that are needed to alleviate the energy and fuel shortage.

ACTIVITIES

1. Have the children list ways energy is used in their community. Start with their home and school. Include energy needed to transport food, clothing, etc., to the home from its place of origin. Also include the energy needed to produce food, clothing, etc.

   Begin to measure the amount of energy consumed in children's homes and in school. Read the gas and electric meters daily. (Most gas and electric meters have 4 dials, each numbered from 0-9. These dials represent the units, tens, hundreds, and thousands places, as in a number between 0 and 9,999.) A pointer on each dial indicates the digit for each place. If the pointer is between two numbers on the dial, you should read the lower number. Keep a record of the meter readings for several days and compare the amounts of gas and electricity used each day.

   * Include a pencil sketch of a meter face showing the pointers and the correct reading.

2. Have the children keep a record of the amount of gasoline used by their family over a period of a month. If each child tapes a 3 x 5 card to the sun visor of each of the family vehicles, most parents would find it interesting and record the date, mileage, gallons used and the cost.

DATE	MILEAGE (ODOMETER READING)	GALLONS	COST ($)

*If the school district is served by school busses, obtain information on the amount of fuel used for the buses and its cost.

*Records can also be kept of the quantities of fuel consumed to heat the home on a weekly or monthly basis.

3. After keeping records for several days on home, school, and automobile energy consumption, have the children calculate the amount that energy costs the school or their family on a weekly or monthly basis. Gas and light companies will furnish rate schedules so that children can calculate cost from the meter readings. If you wish, you can wait for utility bills to arrive in children's homes, but involving children in calculating costs from meter readings and rate schedules is a valuable learning experience. From the data on energy costs for each family, which the children measured and calculated, find the average cost per family and the average cost per person for energy during a week or a month. Using these figures, estimate the amount spent on energy for heating, lighting, and transportation in the community or the state for a week or a month.

   Ask the children if this cost represents the total cost of energy used in the community or state. See if children can identify what energy costs are not included. Energy used in manufacturing and transporting goods, energy used in heating, cooling, lighting, and maintaining public buildings like hospitals, offices, and gas stations are examples of energy costs not counted. There are many others that children will be able to identify and add to the list.

4. Another activity on energy measurement can be done at home by children using the electric meter. It involves comparing the electricity consumption of various appliances. The activity is perfectly safe provided children use normal caution in working with any electrical appliance. Have children look closely at their electrical meter. Just below the dials is a horizontal disc which turns around like a record on a record player. The speed of this disc depends on the amount of electricity being used in the home; when more electricity is being used, it turns faster and when no electricity is being used, it does not turn at all. On the edge of the disc is a black mark that can be used to count the revolutions in a period of time; for example, in a minute.

   If the children count revolutions of the disc per minute when different appliances are on, they will be able to compare the amount of electrical energy consumed by different appliances. It is not necessary to turn off all other appliances while doing this activity, if the children count the number of revolutions before and after a particular appliance is turned on.

   Have the children solicit the help of their parents in filling in the chart on the following page.

5. Children have measured energy consumption and uses at home and in school. At this point, they can begin to address the questions "How can we reduce energy consumption?" "What are the consequences of reducing energy consumption?" (See the "Action Chart" on page 5.)

APPLIANCES	REVOLUTIONS per min. APPLIANCE OFF	REVOLUTIONS per min. APPLIANCE ON	NET REVOLUTIONS
Air Conditioner			
Electric Dryer			
Electric Stove			
Refrigerator			
Electric Water Heater			
Television			
Radio			
Kitchen Lights			
Living-room Lights			
Outdoor Lights			
My Bedroom Lights			

- What appliances take the most energy?
- What appliances take the least energy?
- What appliances run the longest?
- Since cost = amount of energy used per minute x number of minutes, which appliances cost the most to run?

A chart of some actions to reduce energy consumption and the consequences is given below. Children should be able to expand on this chart with help.

Action to Reduce Energy Consumption	Consequences of Action
1. Shut off lights when not in room.	Save money; save energy.
2. Set thermostat at 68°F in winter; lower at night.	Save money; save fuel; need to wear sweater.
3. Walk or ride bike to store for incidental shopping.	Save money; save fuel; get healthful exercise; hard work; inconvenience; time.
4. Use air conditioner less; set thermostat higher in summer, etc.	Save money; save energy; less comfortable.
5. Use clothes dryer less.	Save money; save energy; more work; inconvenience.
6. Walk on class field trips to local facilities.	Save money; save fuel; takes time; good exercise; possible danger.

6. Have the children gather articles about the "energy crisis" from newspapers and magazines. Have them analyze these articles for:

   Accuracy of the statements that are made;
   Evidence supporting these statements;
   Contrary evidence;
   Recommended actions to lessen the "energy crisis"; and
   How people will be affected by the actions.

7. Discuss changes in behavior of people that will be necessary in view of the predicted long-term nature of the "energy crisis." (Suggestion: Don't be a prophet of doom -- nor too much of an optimist in your outlook.)

UNIT 3 :

POPULATION

BY

DON PERRY
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GRADES 7-9 SUBJECT(s)

RATIONALE

Human numbers are becoming increasingly important when viewed in conjunction with the finite nature of our planet and its resources.

The study of population dynamics is a discipline in itself, involving in its entirety, extremely complex concepts and skill requirements, especially in mathematics and statistics. It is not the purpose of this unit to include all concepts at these grade levels. It will provide, however, a basic knowledge of population -- related concepts, develop an awareness of population -- and build a basis for understanding the impact of human populations on the environment and on humans. The sample activities used in this unit are designed to meet these goals and provide a basis from which the teacher can develop further activities.

OBJECTIVES

Upon completion of this unit, students should be able to:

1. Define a population and give examples of several populations.
2. Collect data and prepare a graph of the findings.
3. Identify, analyze, and discuss the major factors which govern population growth and decline.
4. Compute population growth rates.
5. Compute population doubling times.
6. Explain the nature of exponential growth.
7. Understand, and give examples of the problems accentuated by human crowding.

8. Explain how crowding affects them presently, and predict how it may affect them in the future.

9. Identify some aspects of the enormous problem of earthwide hunger.

10. Understand, and explain how the consumption patterns of growing population exponentially increases the demand for natural resources.

11. Construct a theory which reflects how they think population will affect the future and how he or she might affect change in population patterns.

12. Understand the problems inherent in mathematical extrapolation based solely on past trends.

ACTIVITIES

1. To stimulate awareness of human problems having a relationship to population, students interested in art and lettering can design posters, slides, or transparencies, which draw attention to population and its relationship to hunger and consumption. Placed in visible locations, these posters should stimulate interest in the study of population. Students may exercise their creativity by devising illustrations to accompany these suggested quotations:

"While you are reading these words four people will have died from starvation. Most of them children."

-- Dr. Paul Erlich
The Population Bomb

"The baby's stomach bulged. His arms and legs looked like sticks, and although four and one-half months old, Jesus Sanchez weighed no more than he did at birth. The diagnosis: Caloric starvation, scurvy, rickets, pneumonia, and no detectable vitamin C in his blood.

"Guatemala? Peru? No, Southwestern U. S. A., 1971."

-- Paul and Arthur Simon
The Politics of World Hunger

"Every 8 seconds a new American is born. He is a disarming little thing, but he begins to scream loudly in a voice that can be heard for 70 years. He is screaming for 56, 000, 000 gallons of water, 21, 000 gallons of gasoline, 10, 500 pounds of milk and cream, 9, 000 pounds of wheat, and great storehouses of other foods, drinks, and tobaccos."

-- Robert and Leona Rienow
Moment in the Sun

2. Yeast Population Study

   a) Materials: (teams of four)
      10 test tubes
      Aluminum foil
      250 ml. beaker
      Balance (sensitive to .1g.)

Compound microscope
Glass slides and cover slips
250 ml. graduated cylinder
Stirring rod
Source of heat (Bunsen burner)
Eye dropper
Graph paper
Pen or colored pencils

b) Preparation of yeast culture:

Bacto-yeast extract .5g.
(Beef bouillon may be substituted, but the fat must be removed by filtering.)
Potassium phosphate, monobasic .4 g.
Glucose (dextrose) 8.0 g.
(Sucrose may be substituted.)

Distilled water 200 ml.

Add dry materials to the water and dissolve over a low flame while stirring.
*If the above materials are unavailable, a 10% solution of molasses (not containing H_2S) may be used.

c) Preparation of test tube cultures:

Place 10 ml. of the prepared yeast culture medium into each of ten test tubes and cover with foil caps. Sterilize the tubes in an sutoclave, pressure cooker, or by boiling in water for fifteen minutes.

When the tubes are sterilized, number them, one through ten. Inoculate the tubes with one drop of yeast culture, made by dissolving a package of dry yeast in approximately 200 ml. of boiled, cooled tap water. Mix the yeast cells with medium by holding the tube in one hand and striking it with the fingers of the other hand. Keep the test tubes at room temperature and away from places which may receive drafts and thus cause temperature fluctuations.

d) Data collection:

A population count is made each day, starting with tube number one on the first day, tube number two on the second day, etc., until a total of ten counts are recorded on ten consecutive days, exclusive of weekends (weekend counts can be interpolated into the graphed data).

Counts are made by placing a drop of culture on a glass slide, covering it with a cover slip, placing the slide under the "high dry" objective of a compound microscope (approximately 450 x), and using the field of view as the sampling area.

Five fields of view should be counted, moving the slide between counts, and using the average of the five counts as the population total. If the population of yeast cells is too dense for counting, the culture may be diluted by placing 1 ml. of culture in 9 ml. of water. The count can then be made with the diluted culture, multiplying the average count by ten before recording the data. If additional dilutions are necessary, the first dilution is multiplied by a factor of ten, the second by a factor of one hundred, and the third by one thousand over the original culture concentration.

e) Graphing:

Time is graphed on the horizontal axis and population count on the vertical axis. There will be some variation of graphs from team to team, but with a good pattern of exponential growth curves and declining phases included in some. You may wish to combine the data in one graph.

f) The graphical results may be discussed in terms of the nature of the exponential curves and the limiting factors involved in the exponential growth of organisms. In this yeast population study, there is limitation of food, space, and pollution (the producation of toxic ethyl alcohol by the yeast cells).

3. Mathematical Calculations

a) Population, growth rate, and doubling time
June, 1973, statistics furnished by the Population Reference Bureau:

World Population = 3, 860, 000, 000
Growth Rate = 2% per year
Doubling Time = 35 years
United States Population = 210, 284, 000
Growth Rate = .8% per year
Doubling Time = 88 years

b) Population growth rate

The rate of population growth is determined by the difference between the birth rate and death rate. These are usually expressed as so many births and deaths per thousand people each year.

Population growth rate as a percent may be computed by subtracting the death rate from the birth rate and dividing by ten. For example:

Birth Rate = 18/1000
Death Rate = 8/1000
Difference = 10/1000
10 ÷ 10 = 1% growth rate

c) Doubling time

Doubling time is the period of time needed for a population to double in size.

Approximate doubling time can be estimated by dividing 70 years by a population growth rate. For example:

Population Growth Rate = 2%

70 years ÷ 2 = 35 years doubling time

d) Exponential growth

Exponential growth, or geometric growth, is the way in which populations tend to grow. Exponential growth contrasts with arithmetic growth:

The formula for exponential growth is $10 \times 10 \times 10 = 1000$

The formula for arithmetic growth is $10 + 10 + 10 = 30$

The compounding factor of exponential growth can yield astounding results, as exemplified by these two stories:

> "There is an old Persian legend about a clever courtier who presented a beautiful chessboard to his king and requested that the king give him in return 1 grain of rice for the first square on the board, 2 grains for the second square, 4 grains for the third, and so forth. The king readily agreed and ordered rice to be brought from his stores. The fourth square of the chessboard required 8 grains, the tenth square took 512 grains, the fifteenth required 16,384, and the twenty-first square gave the courtier more than a million grains of rice. By the fortieth square a million million rice grains had to be brought from the storerooms. The king's entire rice supply was exhausted long before he reached the sixty-fourth square."
>
> "A French riddle for children illustrates another aspect of exponential growth--the apparent suddenness with which it approaches a fixed limit. Suppose you own a pond on which a water lily is growing. The lily plant doubles in size each day. If the lily were allowed to grow unchecked, it would completely cover the pond in 30 days, choking off the other forms of life in the water. For a long time, the lily plant seems small, and so you decide not to worry about cutting it back until it covers half the pond. On what day will that be? On the twenty-ninth day, of course. You have one day to save your pond."
>
> -- Donella Meadows, et al
> The Limits to Growth

Students may wish to compute the answer to the chessboard problem. The answer is $2^{26} - 1$ (the exact figure can be found on the table of powers of 2).

4. Population Change Simulation

This activity is designed to introduce the concepts of birth rate, death rate, relationship of birth and death to population change, and to develop an awareness of the implications to a population of the limitations of a finite world.

The activity works best in a room with two entrances. One door is labeled "birth," the second one "death." A third of the students are seated at a table representing the living world. The rest of the students are outside the room, representing those who are yet to be born.

1. Start the simulation by introducing a new "life" through the "birth" door, while eliminating one of the living through "death" door at intervals of 10 seconds, until all students outside the room have been used. Count the population in the world of the living.

2. Run the simulation again, but change the death rate to one each 15 seconds while keeping the birth rate at one each 10 seconds. Again, record the population count. This demonstrates that decreasing the death rate causes population growth.

3. Increase the birth rate to one every 5 seconds and maintain the death rate of one every 15 seconds. Record the population count. This demonstrates that increasing the birth rate also causes population growth.

4. Use a birth rate of one each 5 seconds and a death rate of one each 15 seconds, but introduce a new limitation--food resources. Give each living member a card labeled "food resources" and place on the table 10 extra cards so labeled. A card is required to remain in the room. The living members can make necessary changes during the course of the simulation--with one exception--additional food resources, other than the extras on the table, may not be introduced.

5. Ramifications

   a) Crowding

   All over the world, as well as in the United States, most people are crowded together in urban areas. Extreme density of population heightens the competition for limited resources and increases the incidence of these problems.

   b) Pollution

   Greater concentrations of people require greater concentrations of factories, services, automobiles, homes, etc. Therefore, urban dwellers suffer from the lack of pure air and clean water. These same people are burdened with more gases, chemicals, heavy metals, noise, and solid waste.

   c) Stress

   Evidence indicates that crowding puts great psychological and physical stress on human beings. Stress is one of the major reasons that disease, mental illness, crime, drug abuse, poor education, and inadequate housing are more prevalent in crowded urban areas.

   d) Hunger

   As population grows, more food must be produced. Although food production is increasing, population is increasing even faster. Therefore, much of the earth's population suffers from malnutrition and between ten and twenty million people suffer the agonizing death of starvation every year.

e) Resources

As population grows, more and more people are forced to compete for limited supplies of pure air, clean water, fertile soil, timber, minerals, and many other resources.

f) Define a 6 ft. by 6 ft. area in the room and begin with two students inside the defined area with the assigned task of reading a dialogue aloud to each other. Allow them to proceed with the dialogue for a short time. While the dialogue is in process, introduce a second pair of students who are assigned a different dialogue to read. There will now be four students, each attempting to complete the assigned task.

Continue introducing new pairs into the restricted area until the crowded situation makes the completion of the task difficult and the interference of the combined voices increases the difficulty of the task and becomes emotionally frustrating.

Discussion or research may also follow to begin to answer questions that can be identified as related to this activity.

How does crowding affect the efficiency of job performance?

What effects does crowding have on efficient functioning of a large city?

What relationships exist between urban social problems and crowding?

The simulation produced emotional stress related to the noise generated (noise pollution). What pollution problems are created and aggravated by crowding?

What are some possible alternatives to concentrated population areas and their associated problem?

6. Theory Construction

The culminating activity of the entire unit is the construction of a theory which reflects student thinking on population and how it does, and will, affect them.

a) Students should make the final decision as to how deeply to delve into the topic. Since the earth is an interdependent entity, however, it should be suggested that a worldwide perspective is in order.

b) Students should be allowed to express their personal belief that population is a meaningless issue.

c) Students should decide how to present the theory--in an essay, in an oral report to the class, or by an individual oral report to the teacher.

d) It is recommended that a "pass-fail" grade be given for the project.

UNIT 4 :

HOME AND COMMUNITY SURVEY
(A TERM PROJECT)

BY
BETTYE KAPLAN
York High School of Elmhurs
BETTE BORK
Elmwood Park High School
WAYNE SCHIMPFF
Open Lands Project

GRADES 10 - 12 SUBJECT(s)______

RATIONALE

Experience suggests that high school students, in dealing with concepts about the environment, have accumulated many fragments of knowledge as well as skills for problem-solving. Experience further suggests, however, that these students lack the understanding of the implications or consequences of man's decisions about his environment and his responsibility toward it.

All across America, schools are responding to the environmental crisis. Although sincere, most of these schools are failing to influence those values which determine environmental conditions because they are not concerning themselves deeply enough with local problems. The home and the community are areas of environment crying for improved management. The "Home and Community Survey" provides an opportunity for students to develop an awareness of the impact of decision-making in the local environment.

OBJECTIVES

Upon completion of this unit, students should be able to:

1. Identify local environmental problems.
2. Become effectively involved in achieving solutions to the identified problems.

ACTIVITIES

To be displayed in class: A large map of the city, town, or rural area in which the high school is located. This should be divided with a dark marker pen into zones, precincts, or some other appropriate smaller areas which should then be numbered.

1. As areas for study, each student will choose his own zone, or neighborhood, plus one other as different as possible from his first choice.
2. On his own time, outside of class, the student should examine and compare these zones with respect to the following broad areas of concern:
   a) Kinds of land uses involved: Residential, commercial, light or heavy industry, recreational, or agricultural.
   b) Ratio of open space to developed space.

c) Approximate population density.

d) Kinds of residential homes are--rental units, resident-owned, town houses, condominiums, and rural. (Nature of commerce or industry and any special pollution problems introduced.)

e) Job availability to residents.

f) Aesthetic aspects--appearance and noise level.

g) Control of land use and who participates in the decision-making process.

h) Recreational opportunities.

i) Quality of the land and/or any drainage problems.

j) Kinds of roads which traverse the area, quality of maintenance, main points they lead to, traffic and safety problems, public transportation which is provided and how efficient it is, police protection, water supply, sewage removal and subsequent treatment, garbage pick-up, libraries, and schools.

k) Availability of medical services.

l) Taxes for support of public services and total assessed valuation per capita.

m) Names of important public officials, and state, and federal representatives.

3. The student may use any of the following techniques to "learn" his areas:

   a) Direct observations and measurements.

   b) Contacts with people in city, township, and/or county government.

   c) Contacts with any private or public agencies or businesses involved in delivery of vital services.

   d) Interviews with a sampling of residents.

4. The student should use tables and/or graphs to present any statistics of numerical data.

5. The student should be encouraged to draw maps and take pictures to include in his final report.

6. The student should include, at the end of his report, an overall evaluation of the quality of life in his areas and an identification of special problems.

7. The student should include a description of what he expects to do and how he plans to go about solving any particular problem. Students may be given time to speak to the class in an attempt to gain more participants for the efforts, and may also be provided with space in a hall display-case to further his cause.

TO THE TEACHER:

The student objectives outlined above are deliberately much broader in scope than any single such project should probably be. Selection should be made of items which are appropriate for the particular region in which the high school is located.

It is strongly recommended that regular individual student-teacher conferences be scheduled to help students with any special difficulties they may be encountering in meeting their objectives.

UNIT ________:

BY

GRADES ______ SUBJECT(s)______

RATIONALE

CONCEPTS

OBJECTIVES

ACTIVITIES

RESOURCES

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TEACHING/LEARNING MATERIALS

American Education Publications, FOCUS ON POLLUTION, Education Center, Columbus, Ohio 43216. An ecology series, designed for upper elementary-junior high, containing many experiments and teacher guidelines.

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Brennan, Matthew - editor. 1969. PEOPLE AND THEIR ENVIRONMENT: TEACHER'S CURRICULUM GUIDES TO CONSERVATION EDUCATION. J. G. Ferguson Publishing Company, 6 North Michigan Avenue, Chicago, Illinois 60602. Entire series - $27.20, 1 or 2 volumes - $3.95 each, 3 or more volumes - $3.40 each. A detailed curriculum series developed by members of the School of Education of the University of South Carolina, the South Carolina Advisory Council for Conservation Education, and teachers from South Carolina schools. Grades 1 - 12.

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The Center for Science, Mathematics, and Environmental Education. (ERIC/SMEAC) 100 TEACHING ACTIVITIES IN ENVIRONMENTAL EDUCATION, VOLUME II. Ohio State University, 400 Riverside Tower, Columbus, Ohio 43210. Other materials include abstracts and reports on science, mathematics, and environmental education, and a directory of environmental education projects and programs.

Eastman Kodak Company. 1971. IMPROVE YOUR ENVIRONMENT: FIGHT POLLUTION WITH PICTURES. Eastman Kodak Company, 343 State Street, Rochester, New York 14650. 1 copy - $1.00, 2-9 copies - $0.75 each, 10 or more copies - $0.50 each. Ideas for using pictures in environmental studies - a set of colorful environmental photographs is included with the guide. Grades 7 - 12.

Eblen, William - editor. 1972. ECOLOGY SERIES. Academic Paperbacks, the Academic Building, Saw Mill Road, West Haven, Connecticut 16516. $0.95 to $1.25 per volume. These well-written books really stimulate independent thinking. Grades 7 - 12.

Education Ventures. 1971. MIKE'S WORLD -- YOUR WORLD. Education Ventures, Inc., 290 Court Street, Middletown, Connecticut 06457. 1 copy - $0.75, 25 or more copies - $0.60 each. This workbook brings environmental problems down to the level of personal responsibility - an excellent teachers' guide is free with an order of 10 or more copies. Grades 7-9.

Educators Progress Service, Inc. EDUCATORS GUIDE TO FREE SERVICE MATERIALS. Randolph, Wisconsin 53956. A compilation of many free items for teachers.

Environmental and Outdoor Education Materials Company. ENVIRONMENTAL AND OUTDOOR EDUCATION MATERIALS CATALOG. Dowling, Michigan 49050. One of the largest suppliers of books, curriculum guidelines, and other environmental education materials.

Fegely, Thomas et al. 1973. RECYCLING. Educational Services Division, Rodale Press, 22 East Minor Street, Emmaus, Pennsylvania 18049. $1.50. An excellent publication which features interdisciplinary approaches for teaching youngsters to reuse as much as possible -- stresses the inquiry process. Grades K - 8.

Foster, Phillips and Roger Hermanson. 1972. INTRODUCTION TO ENVIRONMENTAL SCIENCE. Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, Illinois 60430. $3.50. This interdisciplinary publication uses the programmed method of presentation and provides a very comprehensive view of environmental problems - written for the college level, but could also be quite helpful in high school courses. Grades 10 - 12.

Illinois Wildlife Federation. THE ILLINOIS CONSERVATION CURRICULUM GUIDE. Illinois Wildlife Federation, 1300 South Western Avenue, Blue Island, Illinois 60406. A 76-page teacher and student guide, containing 35 ditto masters, reading and resource materials and teaching iseas. $3.25.

Marcuccio, Phyllis and Beth Schultz. 1972. INVESTIGATIONS IN ECOLOGY. Charles E. Merrill Publishing Company, 1330 Alum Creek Drive, Columbus, Ohio 43216. $9.95. This interdisciplinary program is composed of seventy investigative lesson cards delving into man's impact on the environment, the importance of interrelationships, and ecological problems - excellent for use in individualized learning situations. Grades 7 - 12.

Matthews, Nancy and Jim Morse - collectors. 1971. THE SIERRA CLUB SURVIVAL SONGBOOK. Sierra Club, Room 1050, 220 Bush Street, San Francisco, California 94104. $4.95. Songs which will help stimulate environmental thinking in music classes. Grades 5 - 12.

Minnesota Environmental Sciences Foundation. 1971. ENVIRONMENTAL DISCOVERY UNITS. National Wildlife Federation, 1412 Sixteenth Street NW, Washington, D. C. 20036. $1.00 to $1.50 per volume. An interdisciplinary series to assist in teaching ecological concepts - each unit includes background information, class projects, materials needed, and discussion questions. Grades K - 12.

National Audubon Society. 1970. A PLACE TO LIVE. National Audubon Society, 950 Third Avenue, New York, New York 10022. Each copy - $0.75, teachers' guide - $1.50. A colorful publication with exercises which help students develop an awareness of their entire environmental surroundings. Grades 4 - 6.

National Education Association. ENVIRONMENTAL EDUCATION PROJECT, The National Park Service, U. S. Department of Interior, Washington, D. C. 20036. Materials for environmental education including information on books, audio-visuals, and directories.

National Education Association, MAN AND HIS ENVIRONMENT: AN INTRODUCTION TO USING ENVIRONMENTAL STUDY AREAS. NEA Publications-Sales Section, 1201 - 16th Street, NW, Washington, D. C. 20036. Produced by the Association of Classroom Teachers, this booklet and filmstrip combination contains two major divisions: Environmental Study Areas and Instructional Activities.

National Wildlife Federation. 1974. EQ TEACHERS' KIT. National Wildlife Federation, 1412 Sixteenth Street NW, Washington, D. C. 20036. $10.00. One of the best bargains in environmental education -includes 25 copies of the excellent EQ INDEX, a color film strip with recorded narration, the pamphlet To Save the Earth, and a teaching guide. Grades 6 - 12.

Olympus Research Corporation. 1972. CAREER EDUCATION IN THE ENVIRONMENT. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. $3.00. This large volume provides information on careers, curriculum, and a variety of resource materials. Grades 7 - 12.

Population Reference Bureau, Inc. THE WORLD POPULATION DILEMMA. Zero Population Growth, 1755 Massachusetts Avenue, NW, Washington, D. C. 20036. A textbook on population designed for elementary and secondary students. Free.

Rand McNally, SCIENCE CURRICULUM IMPROVEMENT STUDY, 405 Park Avenue, New York, New York 10022. Includes teacher guidelines and sequential curriculum activities on the following topics: Populations, Environmental Cycles, Ecosystems, Community and Life cycles.

Schatz, Albert. 1972. TEACHING SCIENCE WITH SOIL, Educational Services Division, Rodale Press, 33 East Minor Street, Emmaus, Pennsylvania 18049. $1.50. Interdisciplinary environmental education, focusing on experimentation with soil. Grades 4 - 12.

Schatz, Albert and Vivian Schatz. 1971. TEACHING SCIENCE WITH GARBAGE. Educational Services Division, Rodale Press, 33 East Minor Street, Emmaus, Pennsylvania 18049. $1.50. Interdisciplinary environmental education, with emphasis on composting under controlled conditions. Grades K - 8.

Stapp, William and Dorothy Cox - editors. 1974. ENVIRONMENTAL EDUCATION ACTIVITIES MANUAL. privately published, 30808 LaMar, Farmington Hills, Michigan. A set of six booklets dealing with interdisciplinary environmental education. Grades K - 12.

Stehney, Virginia. 1974. ENVIRONMENTAL CURIOSITY SAMPLER. State of Illinois, Institute for Environmental Quality, 309 West Washington, Chicago 60606. An environmental studies area handbook for the six counties of northeastern Illinois comprising phase one of a handbook encompassing all of Illinois. Contains activities, ideas for field trips, helpful background information, lists of environmental study areas and bibliographies.

Troost, Cornelius, and Harold Altman. 1972. ENVIRONMENTAL EDUCATION: A SOURCEBOOK. John Wiley and Sons, Inc., New York. A 575-page book of environmental education readings. Includes articles in virtually all areas of environmental education.

Swan, Malcolm - editor. 1970. TIPS AND TRICKS IN OUTDOOR EDUCATION. The Inter-State Printers and Publishers, 19-27 North Jackson Street, Danville, Illinois 61832. $4.50. An outstanding source of environmental teaching techniques. Grades K - 12.

United States Office of Environmental Education, 300 Seventh Street, S.W., Room 424, Washington, D.C. 20202. Distributors of many environmental education materials. Write for information.

Webster-McGraw Hill Book Company, ELEMENTARY SCIENCE STUDY, Manchester Road, Manchester, Missouri 63011. An elementary science project including many materials directly related to environmental education. Complimentary teachers' guides, problem cards, and student kits may be obtained on the topic of "Micro-Gardening."

Werling, Donn. 1973. ENVIRONMENTAL EDUCATION AND YOUR SCHOOL SITE. Illinois Institute for Environmental Quality, 309 West Washington, Chicago, Illinois 60606. Free. Excellent ideas are presented for making maximum use of the school site as a learning laboratory.

AGENCIES AND ORGANIZATIONS

American Conservation Association
30 Rockefeller Plaza
New York, New York 10020

American Forest Institute, Ed. Div.
1835 K Street, N. W.
Washington, D. C. 20006

American Petroleum Institute
School Program
1271 Avenue of the Americas
New York, New York 10020

Bureau of Solid Waste Management
Environmental Control Admin.
Consumer Protection and Environmental Health Services
Arlington, Virginia 22203

Bureau of Sport Fisheries
and Wildlife
Fish and Wildlife Services
Washington, D. C. 20240

Committee for Environmental
Information
438 Skinker Boulevard
St. Louis, Missouri 63130

Ecological Society of America
Radiation Ecology Section
Oak Ridge National Laboratory
Oak Ridge, Tennessee 37831

Environmental Action Coalition
Educational Services
235 East 49th Street
New York, New York 10017

Environmental Association of
Illinois
Lorado Taft Field Campus
Box 299
Oregon, Illinois 61061

Federal Water Pollution Control
Administration
Crystal Mall, Building 2
1921 Jefferson Davis Highway
Arlington, Virginia 22203

Forest Service, U. S. Dept. of Agriculture
Information and Education
Room 3223 South Agriculture Bldg.
Washington, D. C. 20250

Friends of the Earth
30 East 42nd Street
New York, New York 10017

The Garden Club od America
598 Madison Avenue
New York, New York 10022

Illinois Dept. of Agriculture
Bureau of Soil and Water Conservation
Illinois State Fairgrounds
Springfield, Illinois 62702

Illinois Department of Conservation
State Office Building
Springfield, Illinois 62706

Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

Illinois Federation of Women's Clubs
30 West Washington Street
Chicago, Illinois 60602

Illinois Institute for Environmental Quality
309 West Washington
Chicago, Illinois 60606
(Directory of Environmental Groups in
Illinois available free.)

Illinois Pollution Control Board
309 West Washington Street
Suite 300
Chicago, Illinois 60606

Illinois Wildlife Federation
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Blue Island, Illinois 60406

Izaak Walton League of America
1326 Waukegan Road
Glenview, Illinois 60025

Keep America Beautiful, Inc.
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New York, New York 10016

League of Women Voters of Illinois
67 East Madison Avenue
Chicago, Illinois 60603

National Audubon Society
1130 Fifth Avenue
New York, New York 10028

National Parks Association
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Washington, D. C. 20036

National Science Teachers
Association
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Washington, D. C. 20036

National Wildlife Federation
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Washington, D. C. 20036

Open Lands Project
53 West Jackson, Room 1009
Chicago, Illinois 60604

Population Council, Inc.
230 Park Avenue
New York, New York 10017

Sierra Club
1050 Mills Tower
San Francisco, California 94104

United States Department of Agriculture
Soil Conservation Service
State of Illinois
200 West Church Street
Champaign, Illinois 61820

U. S. Environmental Protection
Agency (Region V)
1 North Wacker Drive
Chicago, Illinois 60606

The Wilderness Society
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Washington, D. C. 20005

Zero Population Growth
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Los Altos, California 94022

PUBLISHING COMPANIES

Allyn and Bacon, Inc.
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Boston, Massachusetts 02210

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New York, New York 10022

The John Day Company, Inc.
62 West 45th Street
New York, New York 10036

Doubleday and Company, Inc.
277 Park Avenue
New York, New York 10017

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New York, New York 10017

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New York, New York 10022

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New York, New York 10017

Houghton Mifflin Company
110 Tremont Street
Boston, Massachusetts 02107

Interstate Printers and Publishers
Danville, Illinois 61832

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East Washington Square
Philadelphia, Pennsylvania 19105

McGraw-Hill Book Company
330 West 42nd Street
New York, New York 10036

Natural History Press
Central Park West at 79th Street
New York, New York 10024

Prentice-Hall, Inc.
Englewood Cliffs, New Jersey 17632

Rand McNally and Company
405 Park Avenue
New York, New York 10022

Educational Division
Reader's Digest Services, Inc.
Pleasantville, New York 10570

Simon and Schuster
1 West 39th Street
New York, New York 10018

Time-Life Books
Time and Life Building
Rockefeller Center
New York, New York 10020

The Viking Press, Inc.
625 Madison Avenue
New York, New York 10022

PERIODICALS

Access. Ecology Forum, Suite 303 East, 200 Park Avenue, New York, New York 10017.

American Forests Magazine. American Forestry Association, 919 - 17th Street, N. W., Washington, D. C. 20006.

Audubon. The National Audubon Society, 1130 - 5th Avenue, New York, New York 10028.

Awareness. Goff and Wagoner Nature Publication, 4031 Royter Road, Toledo, Ohio 43623.

Conservation Education. The Conservation Foundation, 1717 Massachusetts Avenue, N. W., Washington, D. C. 20036.

Conservationist. State of New York Conservation Department, Room 324, State Campus, Albany, New York 12226.

Conservation News. National Wildlife Federation, 1412 - 16th Street, N. W., Washington, D. C. 20036.

Curious Naturalist. Massachusetts Audubon Society, Lincoln, Massachusetts 01773.

Current Science. American Education Publications Science Division, 55 High Street, Middletown, Connecticut 06457.

Defenders of Wildlife News. Defenders of Wildlife, Suite 201, 2000 N Street, N. W., Washington, D. C. 20036.

ECO-News. Environmental Action Coalition, 235 East 39th Street, New York, New York 10017.

Ecology Today. Ecological Dimensions, Inc., Post Office Box 180, West Mystic, Connecticut 06388.

Environment. 438 North Skinker Boulevard, St. Louis, Missouri 63130.

Environmental Action Bulletin. Rodale Press, Inc., 33 Minor Street, Emmaus, Pennsylvania 18049.

Environmental Association of Illinois News. Environmental Association of Illinois, Box 299, Lorado Taft Field Campus, Oregon, Illinois 61061.

Environmental Education. Dembar Education Research Services, Inc., Box 1605, Madison, Wisconsin 53701.

Environmental Education News. Michigan Department of Natural Resources, Lansing, Michigan 48926.

Environmental Education Newsletter. ERIC Information Analysis Center, 1460 East Lane Avenue, Columbus, Ohio 43221.

Environmental Newsletter. Environmental Resource Center, The University of Wisconsin Extension, 9722 Watertown Plank Road, Milwaukee, Wisconsin 53226.

Environmental Quality. Environmental Awareness Associates, 6464 Canoga Avenue, Woodland Hills, California 91364.

Interchange. Population Reference Bureau, Inc., 1755 Massachusetts Avenue, N.W., Washington, D.C. 20036.

Journal of Environmental Education. University of Wisconsin, 602 State Street, Madison, Wisconsin 52706.

National Wildlife Magazine. National Wildlife Federation, 1412 Sixteenth Street, N.W., Washington, D.C. 20036.

Population Institute Newsletter. Population Institute, 100 Maryland Avenue, N.E., Washington, D.C. 20002.

Ranger Rick's Nature Magazine, National Wildlife Federation, 1412 - 16th Street, N.W., Washington, D.C. 20036.

Science Activities Magazine. 8150 Central Park Avenue, Skokie, Illinois 60076.

Science and Children and The Science Teacher. National Science Teachers Association, 1201 - 16th Street, N.W., Washington, D.C. 20036.

Sierra Club Bulletin. Sierra Club, 1050 Mills Tower, San Francisco, California 94104.

Today's Education. The Journal of the National Education Association, 1201 - 16th Street, N.W., Washington, D.C. 20036.

Ward's Population Bulletin. Post Office Box 1712, Rochester, New York 14601.

ENVIRONMENTAL READING

Benstock, Mary and David Zwick. 1971. WATER WASTELAND. New York: Bantam Books. $1.50. Water pollution problems are thoroughly studied.

Carson, Gerald. 1973. MEN, BEASTS AND GODS. New York: Charles Scribner's Sons. $8.95. Carson presents a perceptive examination of both cruel and humane treatment of animals.

Commission on Population Growth and the American Future. 1972. POPULATION AND THE AMERICAN FUTURE. New York: New American Library. $1.50. An evaluation of population growth and its implications for America - it calls for population limitation, population redistribution, and resource conservation.

Commoner, Barry. 1971. THE CLOSING CIRCLE. New York: Bantam Books. $1.95. This masterpiece discusses environmental systems, with emphasis on the impact of technology in our environment.

DeBell, Garrett, editor. 1970. THE ENVIRONMENTAL HANDBOOK. New York: Ballantine Books. $0.95. A wide variety of environmental topics are probed by leading authorities -- also, there are many suggestions for group and individual action.

Dennison, George. 1969. THE LIVES OF CHILDREN. New York: Vintage Books. $1.95. This is one of the best and most passionate books ever written about the humanization of education.

Erlich, Paul and Anne Erlich. 1970. POPULATION RESOURCES ENVIRONMENT. San Francisco, W. H. Freeman. $9.50. An excellent and comprehensive overview of environmental systems is provided.

Esposito, John. 1970. VANISHING AIR. New York: Grossman Publishers. $0.95. This detailed work delves into air pollution problems.

Fanning, Odum. 1972. OPPORTUNITIES IN ENVIRONMENTAL CAREERS: New York: Universal Publishers. $5.75. Career possibilities in the many environmental fields are surveyed.

Featherstone, Joseph. 1971. SCHOOLS WHERE CHILDREN LEARN. New York: Liverwright. $2.45. Insights are provided on new educational approaches being tried in America and Great Britain.

Gartner, Alan, et al. 1971. CHILDREN TEACH CHILDREN. New York: Harper and Row. $5.95. A discussion is presented of children functioning effectively as teachers of other children.

Godfrey, Arthur. 1970. THE ARTHUR GODFREY ENVIRONMENTAL READER. New York: Ballantine Books. $0.95. An excellent anthology, which features essays by distinguished authors.

Gofman, John and Arthur Tamplin. 1973. POISONED POWER. Emmaus, Pennsylvania: Rodale Press. $2.00. Gofman and Tamplin are former atomic energy commission scientists who present extensive information on nuclear power plants and the perils they pose.

Goldstein, Jerome. 1973. HOW TO MANAGE YOUR COMPANY ECOLOGICALLY. Emmaus, Pennsylvania: Rodale Press. $1.00. Very useful suggestions are provided for business leaders.

Graham, Frank, Jr. 1970. SINCE SILENT SPRING. Greenwich, Connecticut: Fawcett Publications. $0.95. Graham examines current pesticide problems.

Hovland, Carol and David Hovland. 1972. AMERICA'S ENDANGERED WILDLIFE. New York: Tower Publications. $0.95. The Hovlands present a sincere plea to save America's wildlife.

Illich, Ivan. 1970. DESCHOOLING SOCIETY. New York: Harper and Row. $1.25. Illich calls for an educational process which is more spontaneous, community-based, and humanistic.

Kormondy, Edward. 1969. CONCEPTS OF ECOLOGY. Englewood Cliffs, New Jersey: Prentice Hall. $4.95. The basic principles of ecology are thoroughly explained.

Marx, Wesley. 1967. THE FRAIL OCEAN. New York: Ballatine Books. $0.95. Marx deplores contamination of the oceans.

Meadows, Donella, et al. 1972. THE LIMITS TO GROWTH. New York: New American Library. $1.25. An MIT team presents a computerized analysis of the basic factors which govern growth-population, food production, resource depletion, industrialization, and pollution generation.

McCarry, Charles. 1972. CITIZEN NADER. New York: New American Library. $1.25. McCarry gives insights on Ralph Nader, a man who lives as he speaks.

McInnis, Noel and Don Albrecht. 1975. WHAT MAKES EDUCATION ENVIRONMENTAL. Louisville, Kentucky: Data Courier, Inc. A compilation of articles by forty-four outstanding authors.

Packard, Vance. 1960. THE WASTE MAKERS. New York: Pocket Books. $0.95. A work which exposes the American philosophy of deliberate waste.

Reich, Charles. 1970. THE GREENING OF AMERICA. New York: Bantam Books. $1.95. Reich predicts the humanization of America through the development of a new consciousness.

Rienow, Robert and Leona Rienow. 1967. MOMENT IN THE SUN. New York: Ballentine Books. $0.95. A dynamic description of environmental problems is presented.

Silberman, Charles. 1970. CRISIS IN THE CLASSROOM. New York: Vintage Books. $2.45. Silberman pleads for humane schools which help children learn to feel, as well as to think.

Simon, Paul and Arthur Simon. 1973. THE POLITICS OF WORLD HUNGER. New York: Harper's Magazine Press. $8.95. The Simons call for nationalism with responsibility and suggest ways America can help solve the problems of earthwide hunger and poverty -- a very passionate and thoughtful book.

Stone, Tabor. 1971. BEYOND THE AUTOMOBILE. Englewood Cliffs, New Jersey: Prentice Hall, $2.45. Stone suggests positive ways of reshaping the transportation environment.

Storer, John. 1953. THE WEB OF LIFE. New York: New American Library. $0.95. This work is a classic in the field of ecology.

Swatek, Paul. 1970. THE USER'S GUIDE TO THE PROTECTION OF THE ENVIRONMENT. New York: Ballantine Books. $1.25. Swatek presents practical ideas for improving the home and community environments.

Terry, Mark. 1972. TEACHING FOR SURVIVAL. New York: Ballantine Books. $1.25. This book is a classic in the field of environmental education and provides excellent ideas for implementing interdisciplinary instructional approaches and sound environmental management.

Toffler, Alvin. 1970. FUTURE SHOCK. New York: Bantam Books. $1.95. A penetrating analysis of the perils of rapid change and future environmental diversity is presented -- one of the great works of our time.

Tucker, Anthony. 1972. THE TOXIC METALS. New York: Ballantine Books. $1.25. Tucker writes of the environmental contamination caused by mercury, lead, selenium, cadmium, and chrome.

Wallick, Franklin. 1972. THE AMERICAN WORKER: AN ENDANGERED SPECIES. New York: Ballantine Books. $1.50. Wallick deplores the environmental conditions of the workplace and suggests improvements.

Winter, Ruth. 1972. BEWARE OF THE FOOD YOU EAT. New York: New American Library. $1.25. The Book examines abuses in the food processing industry.

Wood, Nancy. 1971. CLEARCUT. New York: Charles Curtis. $2.75. Wood argues for more careful use of America's forest resources.

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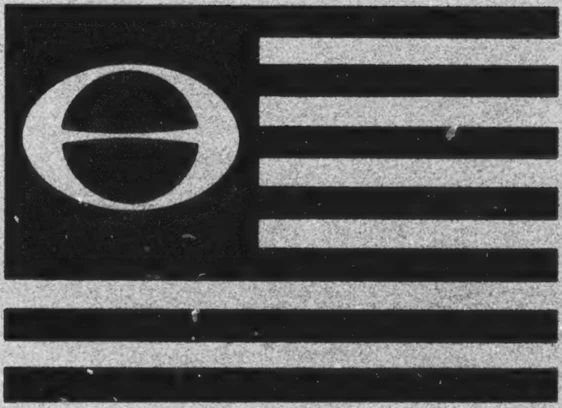

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